TECHNOLOGY DEPT.

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Gas Journal

Vol. 266. 103rd Year. LONDON, MAY 9, 1951. No. 4588. Price 1/-

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EXHIBITION OF THE WORKS OF INDUSTRY
OF ALL NATIONS 1851
I hereby certify that Her Majesty's Commissioners
upon the Award of the Jurors have presented a Prize Medal to
T. Glover
for a Gas Meter
shown in the Exhibition
Exhibition
Hyde Park London 15th Oct.r 1851
President of the Royal Commission

SUBMERGED BELT ASH CONVEYORS

The John Thompson submerged type Ash Conveyor is the simplest and most effective means of ash removal, since it has only a single moving element—the belt itself, a slow-speed troughed rubber belt submerged in water.

The water-trough quenches the ash, minimises abrasion, and reduces friction to a small figure. Power consumption is very low, since the weight of the ash is largely water-borne. This type of conveyor is dustless, noiseless and has virtually negligible maintenance and renewal costs. It can be fitted to any kind of boiler plant and needs no excavating.

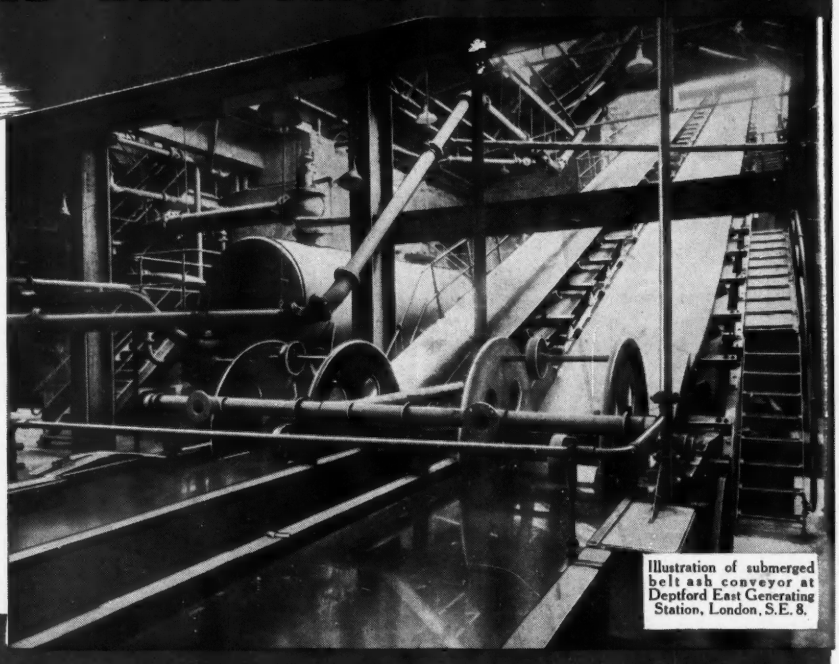

Illustration of submerged belt ash conveyor at Deptford East Generating Station, London, S.E. 8.

THE JOHN THOMPSON CONVEYOR CO.

ETTINGSHALL WOLVERHAMPTON • Telephone ... Telegrams ... Boiler, Wolverhampton

C.7

CENTRIFUGAL PUMPS

of all types and sizes

made by

HIGH EFFICIENCY • ROBUST CONSTRUCTION • ECONOMICAL IN OPERATION

SUITABLE FOR

COKE QUENCHING

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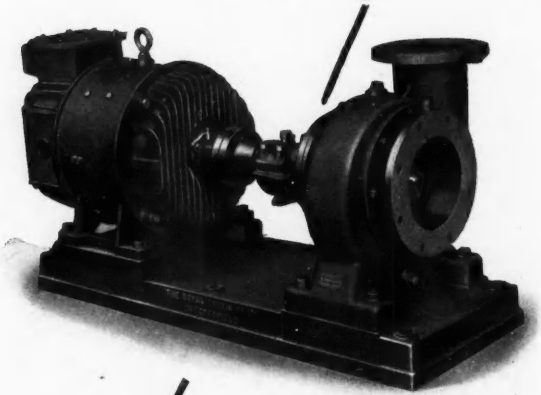
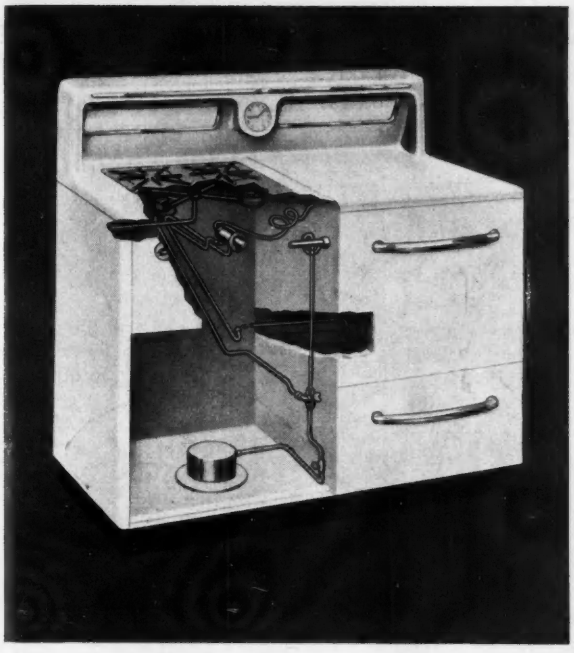
LIME SLUDGE CREOSOTE AND OTHER GAS OILS



The

BRYAN DONKIN COMPANY LTD

CHESTERFIELD



IT'S BUNDY

for every tubing job.

Any way you look at it, Bundy Tubing helps make your stove a better one — in production, performance, and value. No other tubing can match ***all*** its advantages.

In production, Bundy Tubing is swaged, flared, or bent with ease. Its close tolerances cut rejects, help you reduce costs all round.

In performance, parts made of Bundy Tubing last the life of your stove. The copper bonded double walls are extra strong, lightweight and leakproof.

In value, your stove is packed with all the plus points Bundy Tubing offers . . . ready to meet the demands of any buyer. Let us help you find out how Bundy Tubing can help ***you*** build better stoves.

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Telephone : MAYfair 4756/7/8. *Cables :* Bundylim, London.
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GEORGE GLOVERS

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PREPAYMENT METERS

Dependable Year-in Year-out

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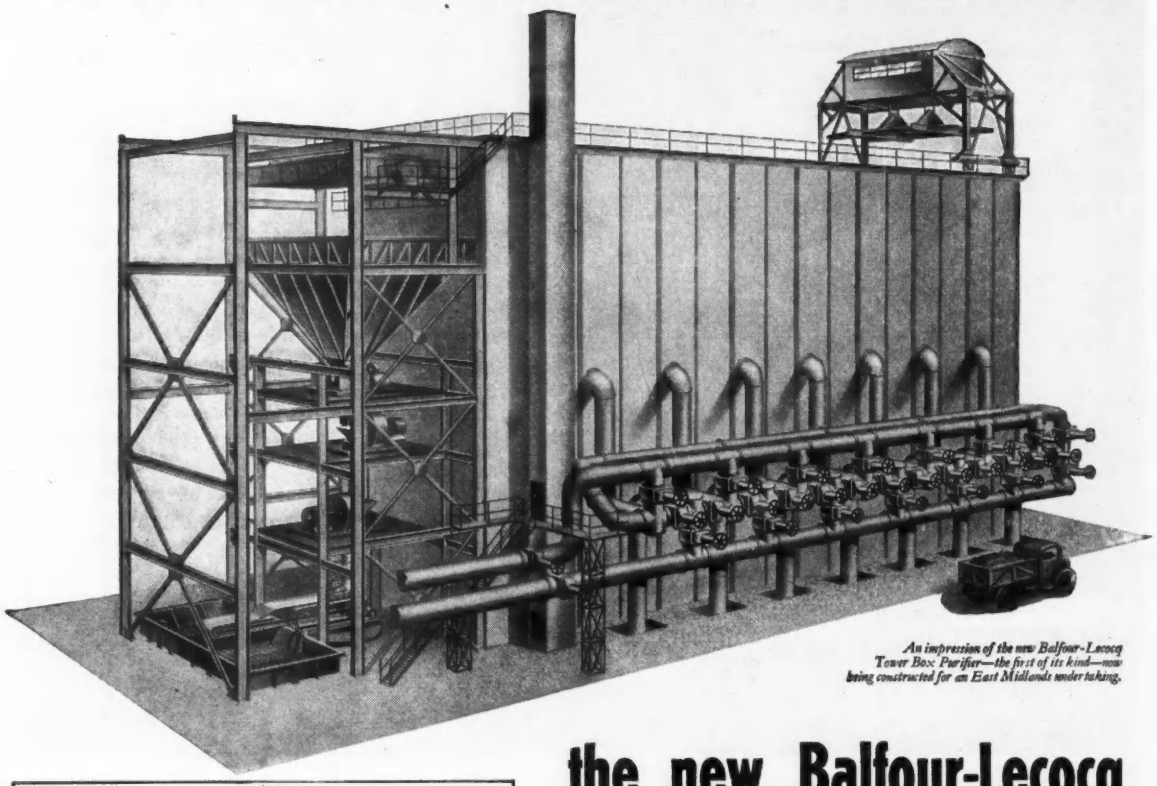
GAS METERS

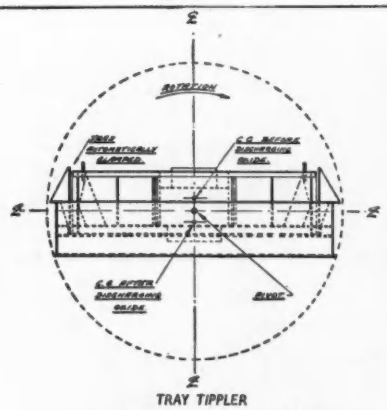
CHELSEA S.W.3.

GEORGE GLOVER & CO., LTD.

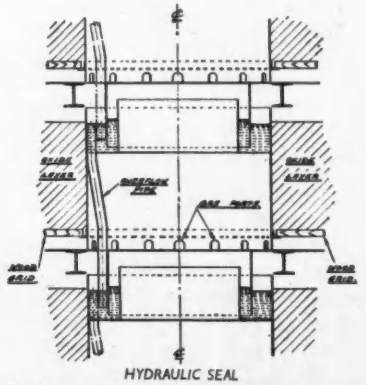
★ A TRIUMPH IN SPACE ECONOMY AND MODERN PURIFICATION TECHNIQUE



An impression of the new Balfour-Lecocq Tower Box Purifier—the first of its kind—now being constructed for an East Midlands undertaking.



TRAY TIPPLER
—a low-power gravity-operated type.



HYDRAULIC SEAL
—a simple type of water sealed interval joint between trays.

the new Balfour-Lecocq TOWER BOX PURIFIER

This latest design of Tower Purifier incorporates all the known advantages of the process and also many new features which have been recently developed. Particular points of interest are reduction in ground space, complete mechanisation, fool-proof jointing between trays, separate drainage for each tray, minimum surfaces for painting, etc., unidirectional flow of gas, and ease of change-over of towers which can be carried out within a few minutes.

The technical resources of the Balfour organisation are at the service of those requiring detailed information on the application of Tower Purifiers to their own needs.

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OF LEVEN

LEADERS IN GAS ENGINEERING FOR OVER A CENTURY AND A QUARTER

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WITH THE FAMOUS *Armourplate* GLASS PANEL DOOR !

You'll find it easy to demonstrate the advantages of a Vulcan! The Glass Panel Oven Door is a favourite feature with housewives. *Guaranteed* shockproof and fireproof, it retains full oven-heat and does not steam over.

A free-standing cooker, mounted on totally-enclosed plinth, the Vulcan has many other selling features, including heat-regulator, closing cover-plate, safety taps, and clean, compact design. Alternative fittings include enamelled door, choice of different oven capacities, and a variety of finishes.

Every Vulcan ARMOUR-PLATE Glass Door carries an unconditional guarantee against breakage.

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DOUBLE - CONTROL GAS COOKING

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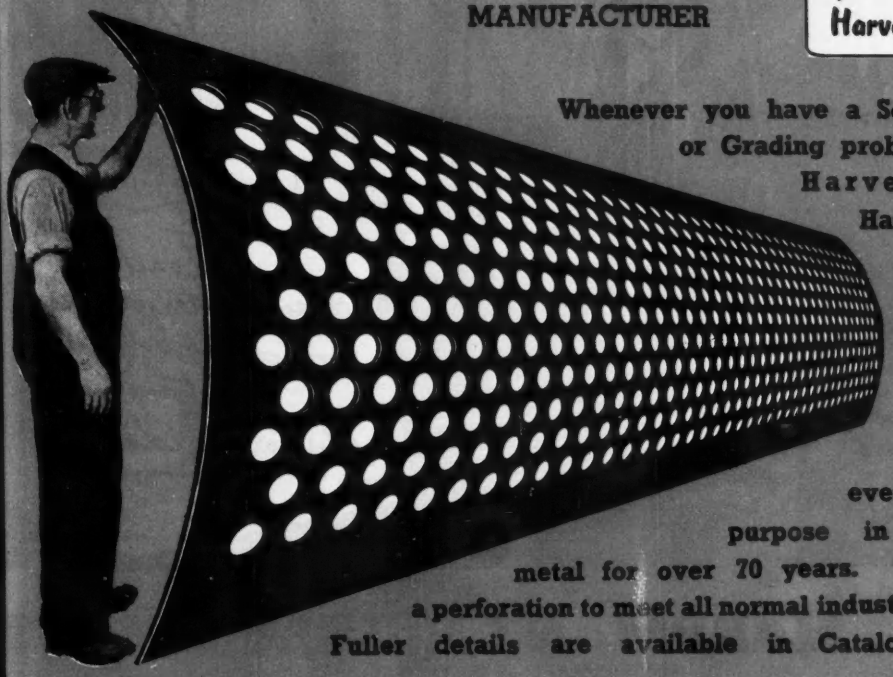
Associated Company of United Gas Industries Ltd.
Telephone: Exeter 5301-2 Telegrams: "Vulcan, Exeter"

TO THE GAS PLANT MANUFACTURER

Yours the problem- Harveys the answer!



Whenever you have a Screening, Sorting or Grading problem — remember Harveys. Because Harveys have been making

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perforated metal screens for every conceivable purpose in every kind of metal for over 70 years. There is available a perforation to meet all normal industrial requirements. Fuller details are available in Catalogue G.J. 782.

G. A. Harvey & Co. (London) Ltd. Woolwich Road. London. S.E.7

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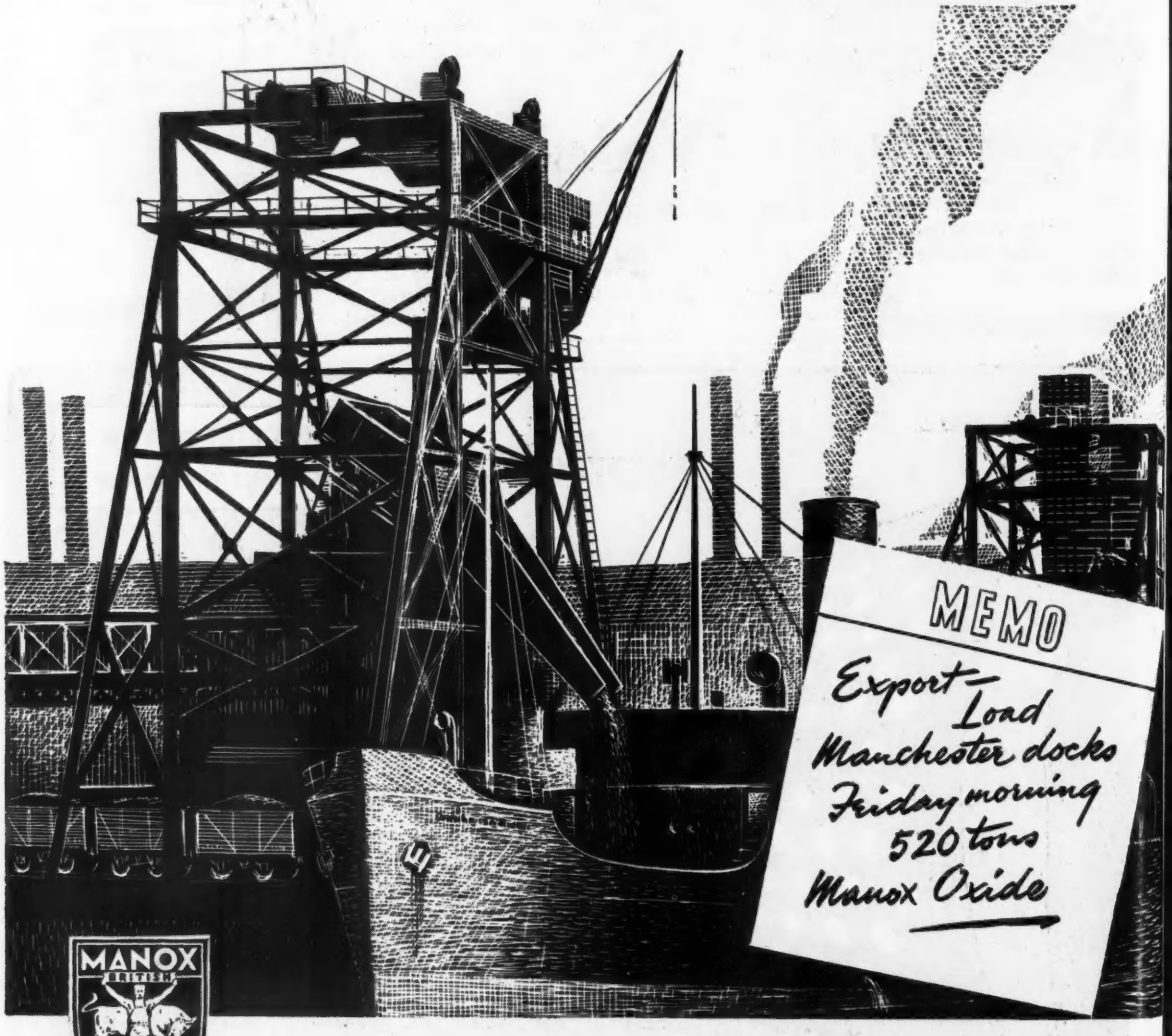
FOR THE GAS INDUSTRY



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INCORPORATING MANCHESTER OXIDE CO LTD

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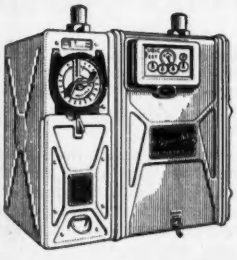
Precision built in die-cast corrosion resisting light alloy



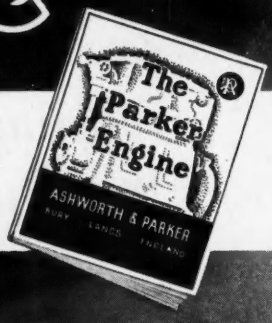
The BEGWACO GAS METER is an entirely new conception. "Tin and solder" methods are replaced by automatic precision engineering technique; older materials give way to corrosion-resisting light alloy die-castings. The result is a robust and remarkably accurate corrosion-resisting meter that is badged at 200 cu. ft./hr. without exceeding D.1 case dimensions.

BEGWACO METERS LIMITED · QUEEN STREET · FARNWORTH · LANCS

Turn waste steam into power

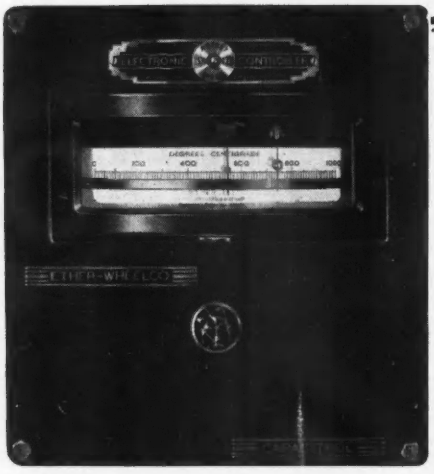
by installing a

Parker STEAM Engine



DO YOU USE STEAM IN YOUR WORKS? Write for this catalogue which gives full details of engines which can help you to economise by using the difference between boiler pressure and process pressure to generate your own electricity or drive important plant.

ASHWORTH & PARKER LTD., RIVERSIDE WORKS, BURY, LANCS.



Ether-Wheelco "Capacitrol" E.W.221.

This instrument utilises electronic action to achieve rapid and accurate control of furnace temperature. Supplied for On, Off, High, Low and Proportional Control.

Ether "Indicorder" Type C.R.M.S.

Indicate, Record and Control Gas Furnace Temperatures automatically. Made for Wall or Panel Mounting. Send for List No. 645.

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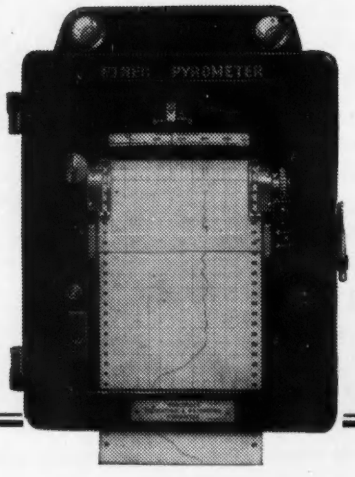
TEMPERATURE CONTROLLERS

Mechanically and Electronically Operated



Pass your automatic temperature problems to us — We design and manufacture a full range of instruments and Valves and can advise the most suitable apparatus to meet your requirements.

We also manufacture, under the American Wheelco Co. Patents, a range of Ether-Wheelco Electronic Controls which, when supplemented by our normal Ether range of Instruments, cover every Automatic Temperature Control requirement.

Our technical advisory service is always at your service.

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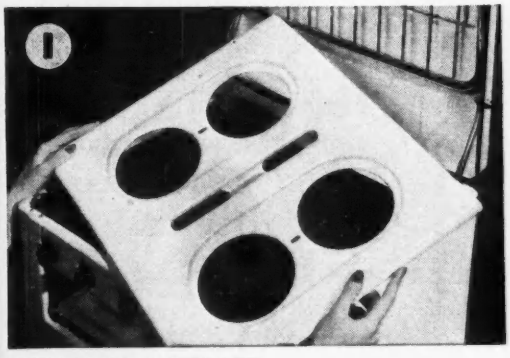
NOW 2 more reasons

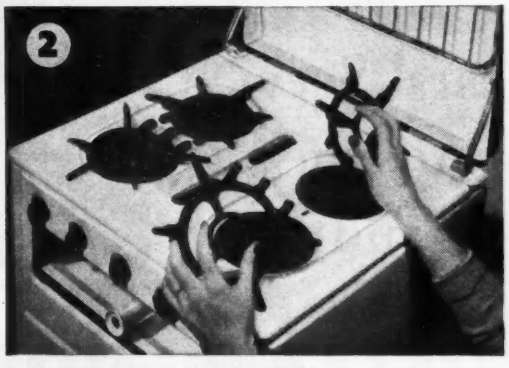
why women fall in love fast with the General C31 Gas Cooker

ONCE AGAIN General Gas announce an improved design for their gas cookers . . . changes that the housewife will thankfully realise mean less cleaning bother and lasting good looks for their General Gas cookers. Such leadership in design is giving General Gas appliances leadership in sales, too.



REVERSIBLE HOTPLATE

No nuts or bolts to bother with . . . the hotplate lifts up, can be turned right round and dropped back into position.



INTERCHANGEABLE TRIVETS

They all lift out easily and can be dropped back in *any* position.

This BIGGER cooker sells and sells for all these reasons, too

BLACK OR BLONDE TOP — A light-coloured hotplate, now reversible for even wear — or the conventional fixed black top.

FOUR HIGH-SPEED BOILERS — Each easily removable for cleaning — interchangeable now, too.

GENEROUS OVEN SPACE — Thermostatically controlled, 18" oven — maximum recommended — suitable for the largest families.

FASTER GRILLING — With the new large area griller.

EASY CLEANING — Streamlined design, stain-resisting, enamel.

SAFETY TAPS — Spring-loaded for hotplate—drop-handle for oven.

OPTIONAL TOP — Folding cover-top or fixed splash plate — both with plate rack.

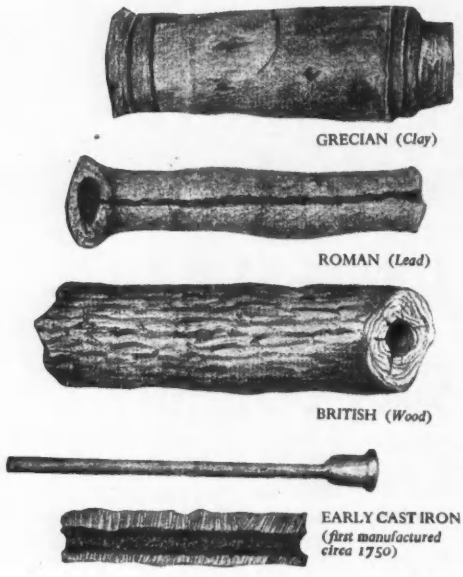
For further information and details of other products, write to:

GENERAL GAS APPLIANCES LIMITED

AUDENSHAW, MANCHESTER

(*Proprietors: Allied Ironfounders Ltd.*)

TRADE MARK



Pipes in different Ages

FOR many centuries progress was slow in pipe making, and it was only 200 years ago that cast iron came into use for the purpose. Since then the advance in the technique of manufacture and of joint types, together with the introduction of steel, has made possible the laying of mains that remain "bottle tight" under modern traffic conditions, and which render distribution losses negligible.

In the 20th Century

PRESS for MAINLAYING

Cutting 36" C.I. Pipe

[Photo by courtesy of the North Thames Gas Board

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FIRST CLASS CONSTRUCTION

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The choice of

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will ensure a plant of First Class Construction completed within the shortest possible time

Our records show that we can complete new plants within 18 months to 3 years from date of order, naturally depending upon the size of the installation viz:—

½ to 1 million cubic feet/day in - - - -	18 months
Up to 8 million cubic feet/day in - - -	3 years

C.O.L. INTERMITTENTS therefore are not only sooner in full production but they also possess these well-known advantages

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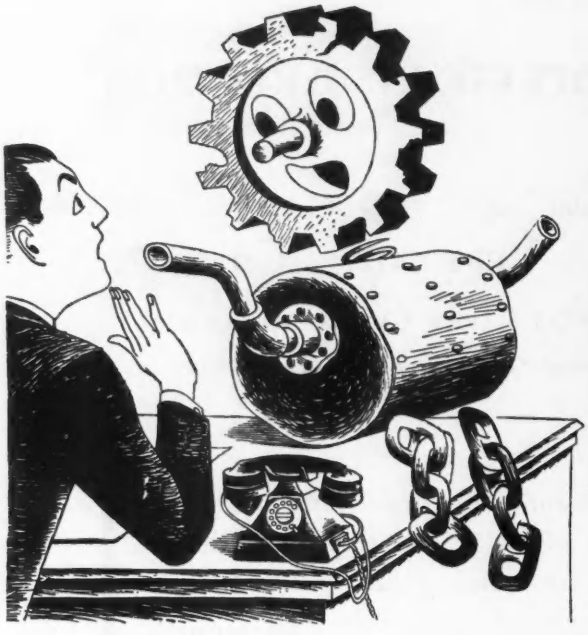
What are you doing about me?

says JACK SCRAP



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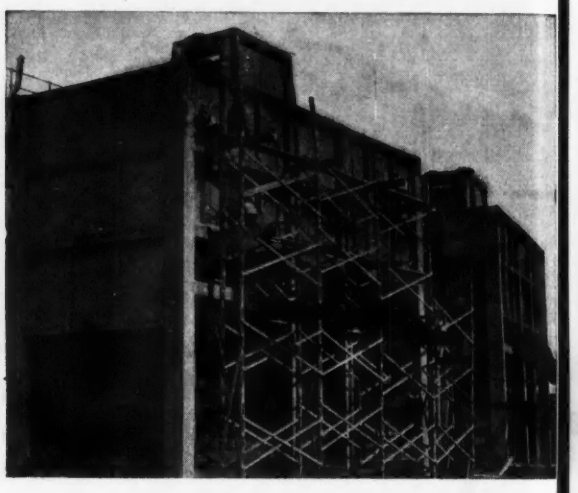
Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

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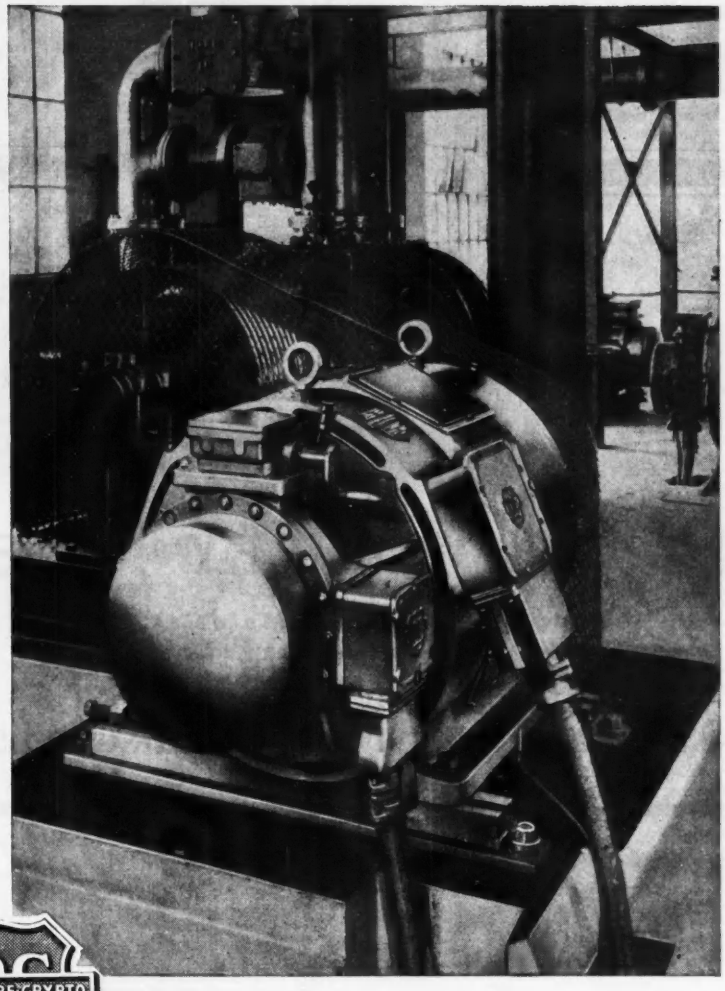

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There is an L.D.C. motor of the correct enclosure including flameproof, for any industrial situation.

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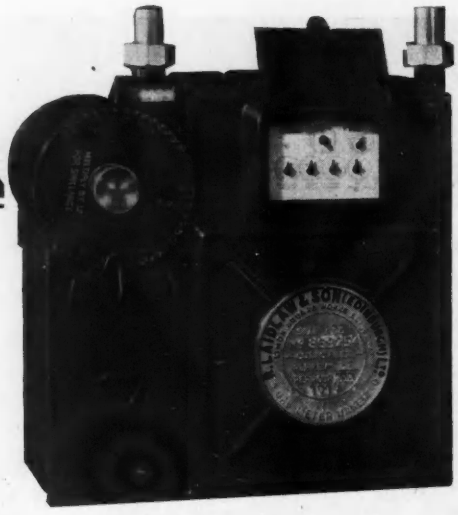

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Aluminium or stainless steel canopy • Mild steel welded pans specially designed to eliminate fire risk • Body of mottled, grey enamelled cast-iron • Sliding doors over pans, chip box and hot cupboards • Swivel pilot lights to burners • Safe, hygienic and easily cleaned. Write for full details and prices.

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PF.2

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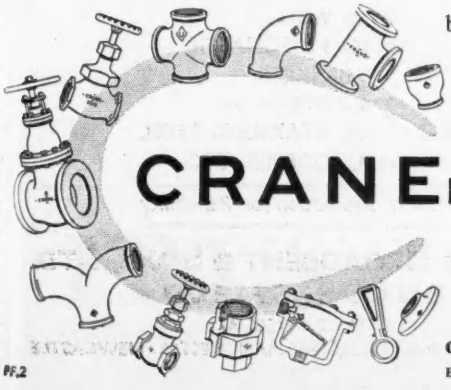

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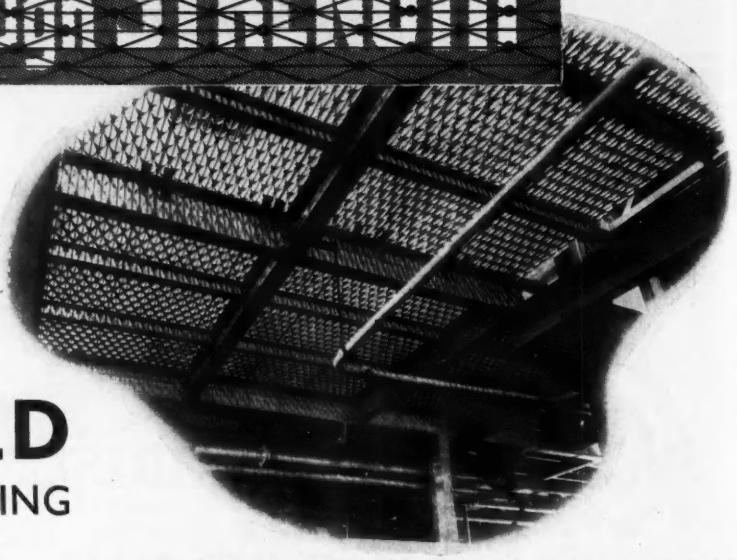
VISIT OUR STAND NO. D314 IN THE ENGINEERING GROUP OF THE B.I.F. CASTLE BROMWICH

LIGHT through STRENGTH

"and the strength is in the weld"



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STANDARD TYPE MACHINES
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WITH
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BASKETS
FABRICATED FROM
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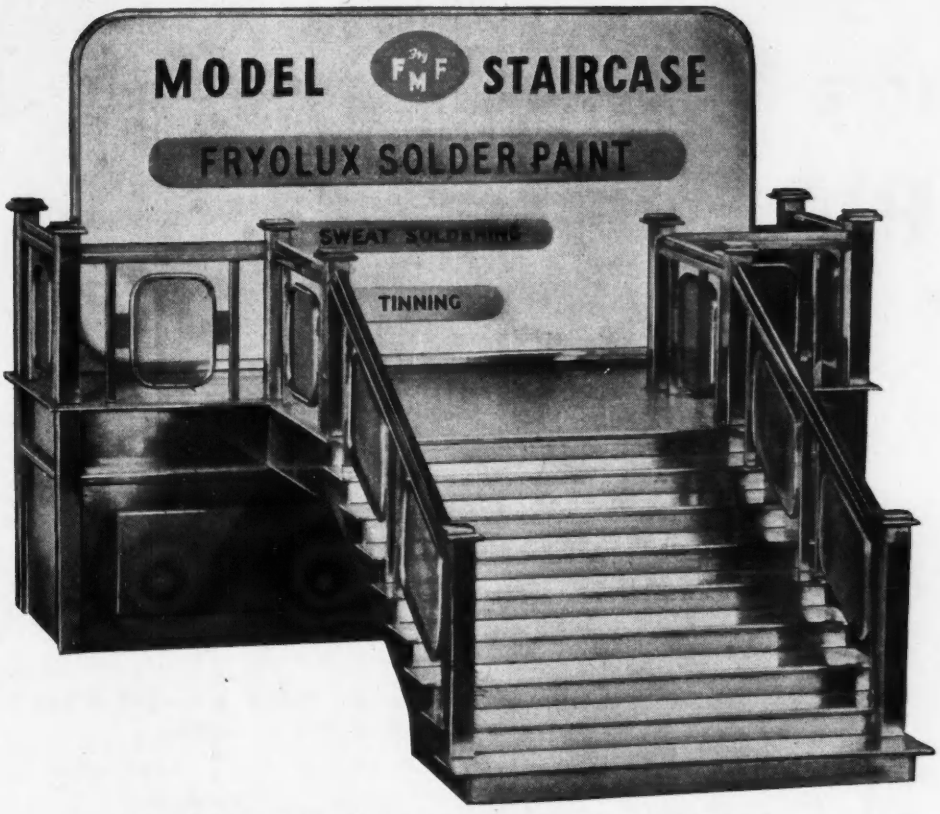
FRYOLUX SOLDER PAINT *simplifies* SOLDERING



This model illustrates the ease with which complicated multiple assemblies are soldered using Fryolux solder paint.

The model is jointed, both lap and butt, entirely by Fryolux solder paint and consists of 160 separate pieces of brass and copper making a total of 260 soldered joints.

Technical Publication No. 22 describes the various types of Fryolux solder paint supplied and their application showing a great saving in both time and material costs.

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REDUCE TO A MINIMUM THE COST OF DIE REPLACEMENTS WHILST MAINTAINING A PERFECT CUTTING EDGE

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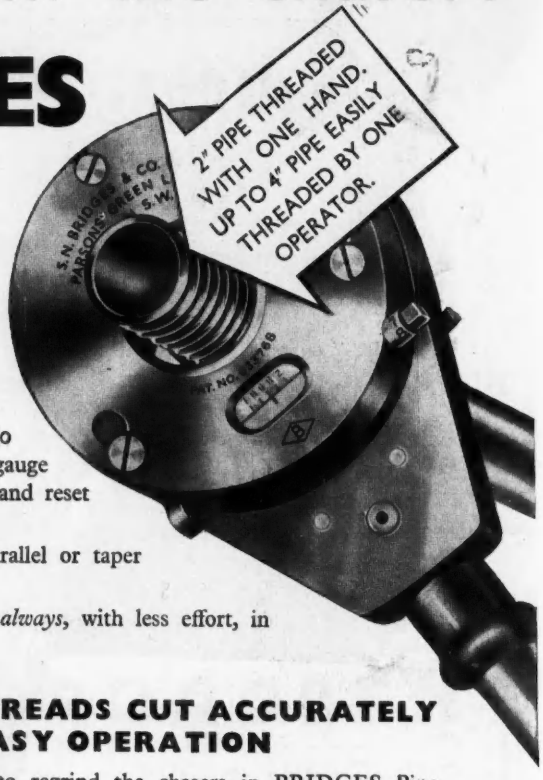

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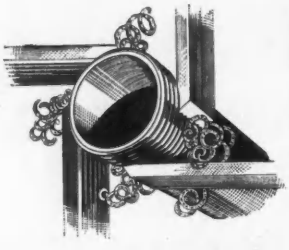

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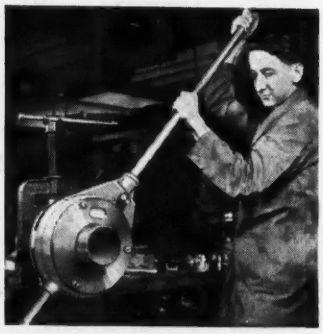

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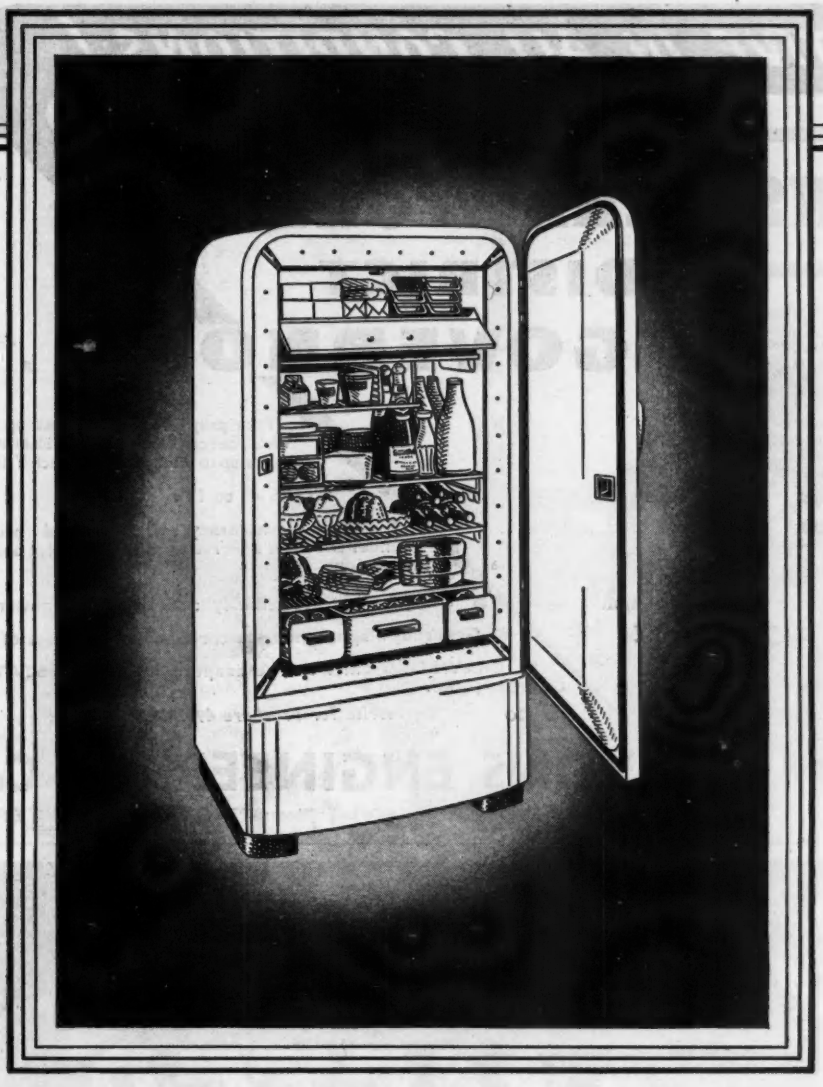

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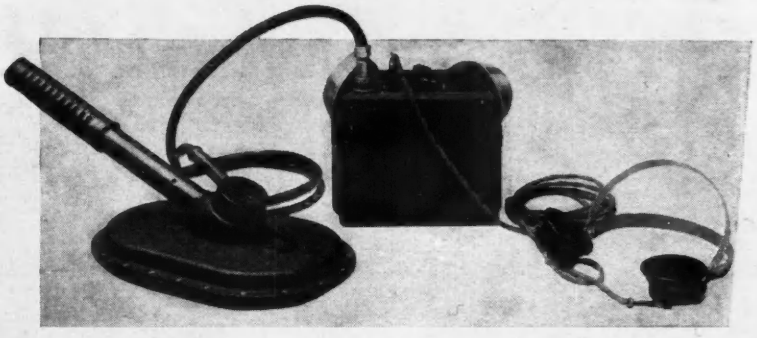

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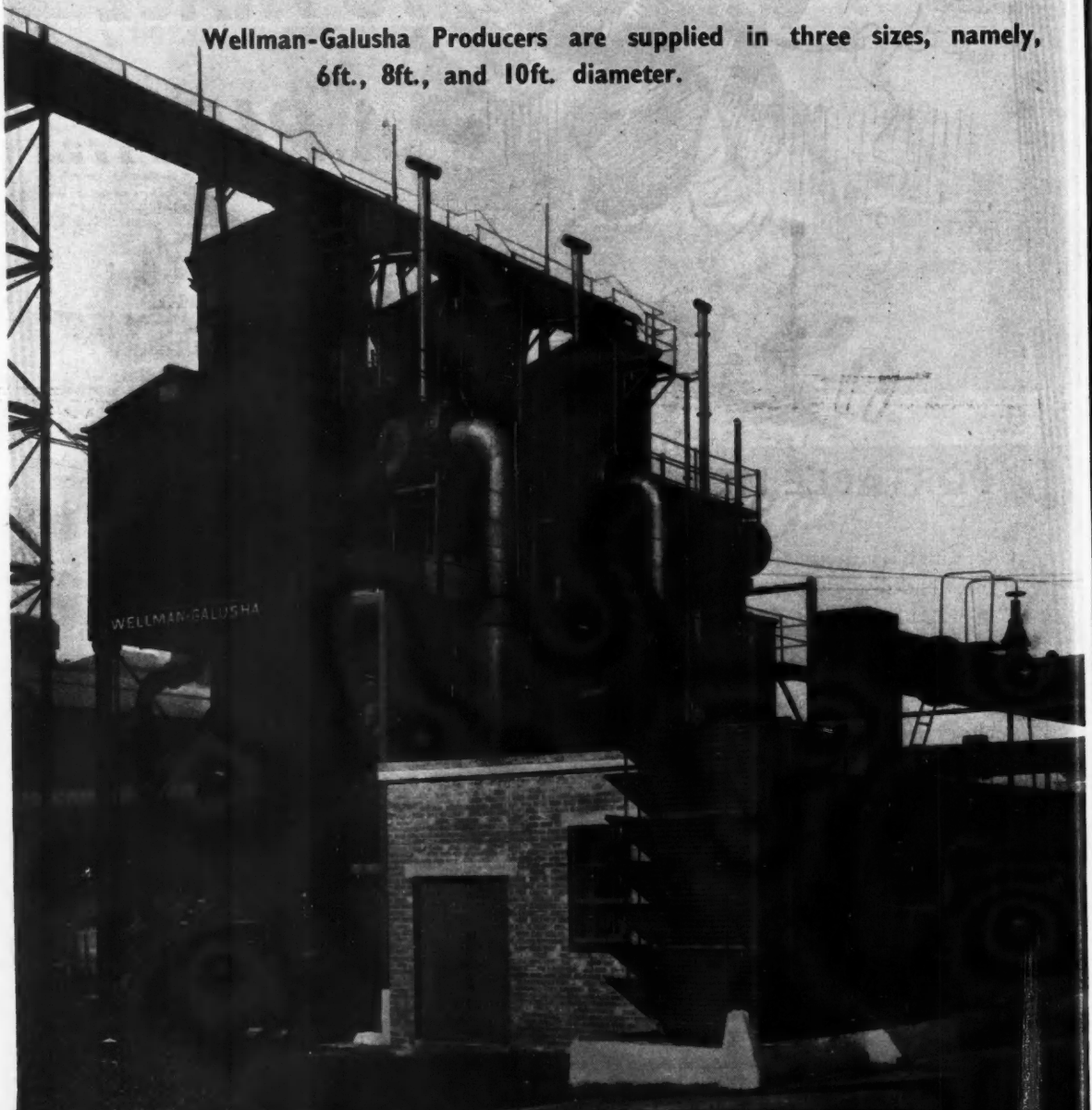

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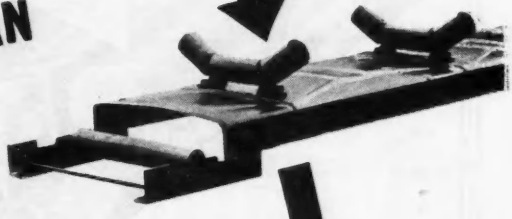

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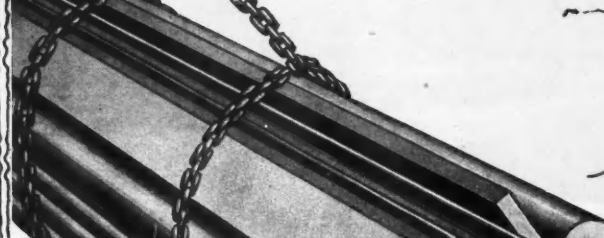

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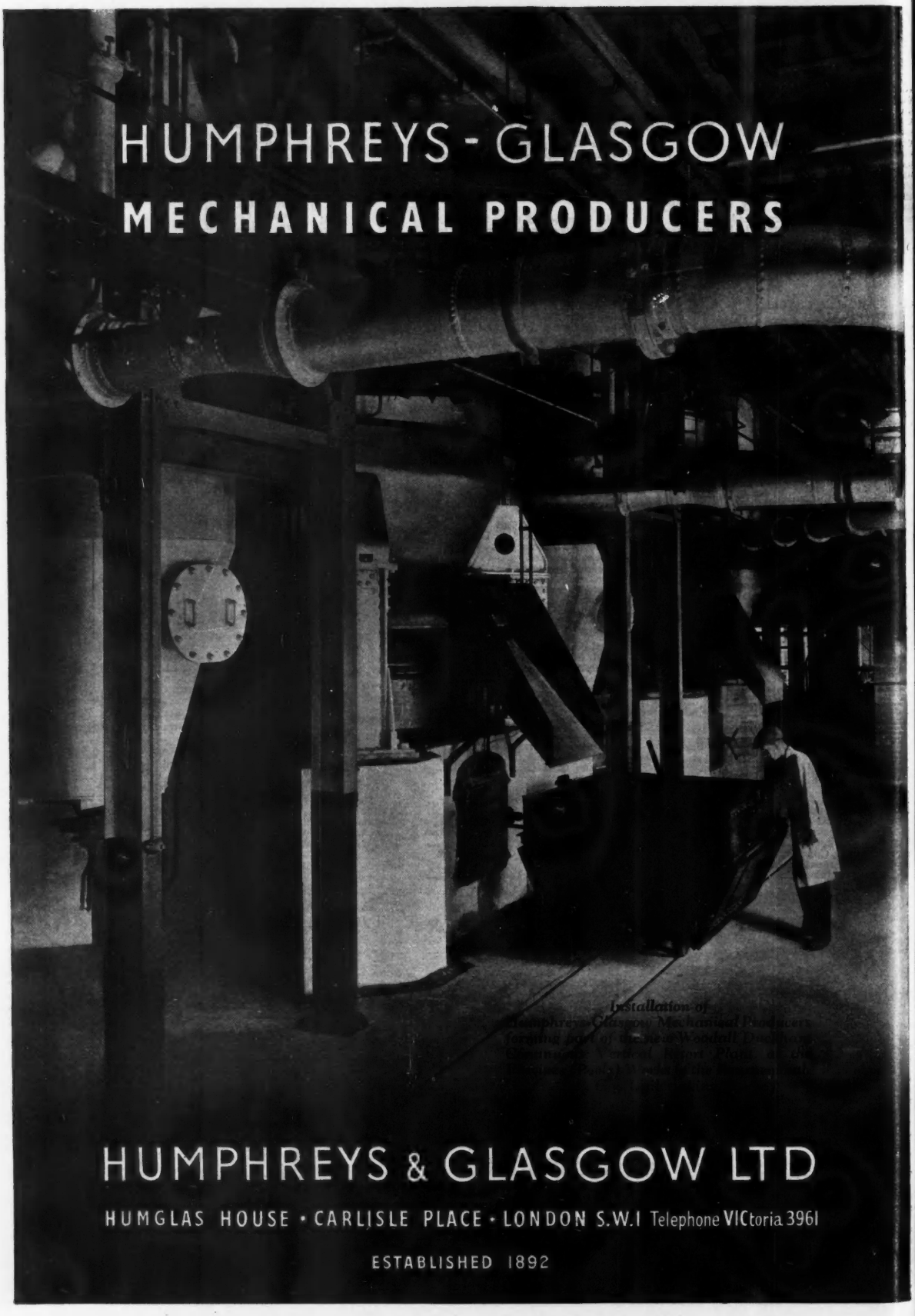
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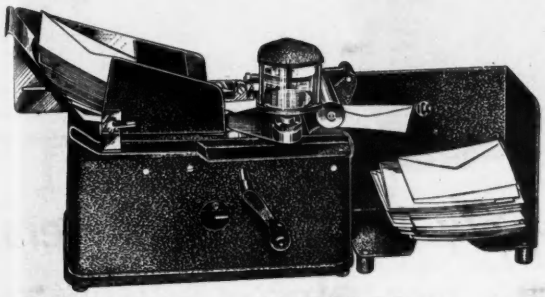

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103rd YEAR OF PUBLICATION

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GAS JOURNAL

VOL. 266. NO. 4588 103RD YEAR MAY 9, 1951

SKEGNESS II

THE Deputy Chairman of the East Midlands Gas Board waxed biblical at Skegness last Friday, reminding his audience that the Lawgiver 'chose able men out of all Israel and made them heads over the people, rulers of thousands, rulers of hundreds, rulers of fifties, and rulers of tens . . . . The hard causes they brought to Moses, but every small matter they judged themselves.' At the Area Staff Conference on May 3 and 4 there were representatives of all such rulers among the 163 staff members who attended, and who brought with them 69 wives (in all). All members of the E.M.G.B. were present at one or more sessions, as were representatives of the Consumers', the Joint Industrial, and the Gas Staffs' Councils. Among the visitors were the Deputy Head of the People, Colonel H. C. Smith, who chose the occasion for the important pronouncement which is printed in this issue, and Rulers of Thousands Diamond and Currier.

We were left with the impression that the conference had been, from start to finish, an outstanding success; further, and more important than the event, that even if in the early days of nationalisation there had been heart-searchings and inevitable suspicions, these had been forgotten in an atmosphere of hard work and co-operation towards a common objective. During the war we learned something of group psychology and to distinguish between traits and actions which were group cohesive or group disruptive; we should say the group represented at Skegness is most satisfactorily cohesive. Also during the war we learned that the best definition of a leader is one who gets the best out of his subordinates; we fancy that applies to the present case, from the Rulers of Thousands to the Rulers of Tens. The Chairman of the Board, Mr. H. F. H. Jones, stated in his opening address that he believed that those who worked for them showed as much loyalty, enthusiasm, and keenness in carrying out their duties as do the staffs of the best privately owned businesses. Mr. Jones, with his tradition and background, should be able to judge.

If Mr. Jones and we ourselves are right in thinking the E.M.G.B. is a good 'set-up' (perhaps we might venture 'joint' instead of the other shocker), much of the reason-why will be found in Mr. Sydney Smith's 'Few Thoughts on Management,' which, with our general report of the proceedings, will be published later. They were comfortable thoughts and at the same time illuminating. He pointed out, for instance, that for successful operation of a large public organisation, accepted policy must be observed, yet rigid rules and regulations which may restrict initiative, destroy enterprise, and lead to general frustration are to be deplored. Thus they see to it that Board policy and decisions are fully explained to managers and all others concerned with administration, while full use is made of the combined knowledge and experience of those same men, who may at times feel that their suggestions do not always get very far. The balance, said the Deputy Chairman, is delicate, but much is accomplished towards maintaining it by conferences at all levels.

The papers themselves at the conference were well fitted to put people into the general picture. It was a novelty to hear a joint paper by the Chief and two Divisional Accountants—a paper evidently commissioned to clarify matters and tie more closely a bond over which 'teething troubles' had been experienced. 'Main-laying Costs' presented an attractive picture of possibilities in a large organisation; and the human problem, already stressed by the Deputy Chairman, was followed up by the Education and Welfare Officer. The Sales and Service Manager of Sheffield and Rotherham dealt on broad lines with 'Progress through Service' (could you, Mr. Wylie, have meant *Local* Press when you referred to the necessity for establishing friendly relations with the Technical Press, or have we slipped up?); and finally there was 'Question Time', wherein we failed signally to detect an undercurrent of repression, inhibition, or frustration, or even serious objections to accountancy.

LLANDUDNO

MOST of the 189 members of the Wales and Monmouthshire Section of the Institution of Gas Engineers spent a strenuous 'holiday' at Llandudno from Wednesday to Saturday last week. True, the official technical sessions occupied under six hours, but the full programme of social, sporting, business, and technical events made big demands on the energy of everyone, not forgetting the ladies, who attend only one of the four gatherings each year of gas men in Wales. The 'Wales and Mon.' meets twice a year, but since the spring of 1949 those of and above group chairmanship status have also met at six monthly periods, and interchange of thought and experience has never been so full and frank. That may be the reason for having so crowded a programme at the spring meeting, but a Presidential Address and four technical papers on a single day was rather more than a feast.

We are all in favour of the idea of the short paper symposium, but the field covered on Thursday was so wide that any two of the papers instead of four would have been preferable from the point of view of the difference between an adequate and a rushed discusion. Mr. Powdrill's Presidential Address was noteworthy for its sincere tribute to the success of the nationalised structure in and peculiar to Wales. Mr. C. A. Masterman was in characteristic good humour in describing the progress of underground gasification. Of the afternoon papers, that of Mr. K. M. Ernest on space heating and that of Mr. H. J. Stanley on improving gas making conditions on a small works were both of severely practical value. Mr. A. D. Howells, in his paper on butane, introduced a subject that promises to be of importance to Wales, on which Mr. E. M. Edwards, Member of the Board, who has been making a special study of the subject for a long time, contributed a vast amount of highly interesting information. Given long term availability at the right price, there is a great future for the use of butane in those parts of Wales where gas undertakings have in fact been closed down and where existing small works are unlikely to be put into such a state of efficiency as to make normal coal gas making a reasonable proposition. We report the meeting, the luncheon speeches, and the social events on another page of this issue and we look forward to dealing later with the technical fare.

Cyfarfod Llandudno oedd y pedwerydd i'w gynnal yng Ngogledd Cymru, ond y cyntaf er pan gyhoeddwyd adroddiad cyntaf y Bwrdd Nwy. Bu'n ddatguddiad pellach o'r ymwybyddiaeth cymreig hwnnw a feithrinodd y Senedd wrth ymdrin â Chymru am y tro cyntaf erioed fel uned gyfan i bwrpas gweinyddiaeth ddiwydiannol. Rhagwelodd y peirianddion nwy yr undeb hwn rhyw saith mlynedd yn ol. Yr adeg honno unwyd Cymdeithas Gogledd Cymru, y leiaf o'r ddwy, a Chymdeithas Cymru a Mynwy, y fwyaf a'r hynaf, yr hon a esgorodd yn ddiweddarach ar Adran Ranbarthol y Sefydliad. Er 1944 bu cystadleuaeth rhwng De a Gogledd parthed eu brwdfrydedd dross gyfathrach gymdeithasol a thechnegol. Ond yn wir, yr oedd y teimladau da a ffynnai drwy gydol un o'gyfarfodydd mwyaf poblogaidd y Sefydliod yn deyrnged uchel i gynlywyddion ac aelodau Cyngor y Gogledd, ac hefyd i ynui a gorawydd yr aelodau ieuainc. Ffrwyth parodrwydd yr olaf iddarllen papurau oeddy rhaglen dechnegol o natur mor amrywiol ac eang. Dilynwyd un dydd hafaidd o golffio a pheldreiglo gan un arall glawog ond llawn busnes a thrafodaeth dechnegol, tra treuliwyd y nosweithiau i ddawnsio a mwynhau ffilmiau newyddion y Cyngor Nwy. Daeth myfyrwyr yno i dderbyn eu gwobrau am eu llwyddiant yn yr arholiadau, a daeth aelodau hŷn yno—llawer ohonynot wedi ymddiswyddo ers tro—i ail-gynneu cyfeillgarwch. Cyfarfod hyfryd ydoedd, a fydd byw yn hir yn y cof.

LIQUID METHANE FOR PEAK LOADS

THE gas industry has always enjoyed certain advantages over its electrical competitor in the production, supply, and distribution of potential heat. In the first place there is considerable flexibility in most existing methods of gas production from coal and/or coke. And in the second, the practicable degree of storage capacity is sufficient to smooth out most normal day-to-day variation in demand. But recent extensions of demand, particularly for space heating, are tending to make seasonal demands unmanageable. The proposal to withdraw a proportion of the methane content from the gas stream and to store it in liquid form is at first sight a most attractive one. It amounts to an immense increase in storage capacity. Dr. Haselden and Mr. Reis, in a paper jointly to the Institution of Gas Engineers and the Low Temperature Group of the Physical Society (we deal with the paper in this issue), have presented this proposal with admirable lucidity.

Some of the features of the scheme should be carefully noted. As we understand it, after considering several possibilities, the proposal is to select a very large gasworks, with a capacity of 40 mill. cu. ft. per day, a works, that is, of a size of which there are only two or three in the country, and to extract by complicated and expensive methods involving a high degree of refrigeration the methane content of 100,000 cu.ft. of gas per hour. To retain the declared value of 500 B.Th.U. the calorific value of gas produced would be increased to 560. The methane would be stored in tanks at atmospheric pressure but at the very low temperature of − 161.5°C. The safe construction of the storage tanks involves the selection of suitable and special materials arising out of the fact that at this low temperature iron and low-alloy steels display a very rapid deterioration of impact strength and of stress resistances in tri-axial loading. Aluminium or stabilised austenitic steels are suggested. Insulation is also another problem, although not an unsolved one. An approximate estimate of the cost of separating, liquefying, and storing the methane shows a figure of 24.7d. per therm. This figure does not include certain consequential costs, such as the increased cost of making gas at the necessary higher calorific value. Nor is any estimate given of the increased quantity of coal which

would be required, if this necessity is admitted. Power at 3.84d. per therm also means coal. The estimate does include, however, what one speaker described as the enormous figure of 15.8d. per therm for capital charges.

Most of the objections put forward centre round the high cost of this method of providing peak load therms. The figure quoted applies to the very large installation only. It is admitted that costs would be definitely higher if installed on a much smaller scale; for a plant of one-tenth the size mentioned the cost might be 50% higher. But the main objection of the gas technicians who took part in the discussion appeared to be that it involved the introduction of a new technique into the gasworks routine. They no doubt had in mind the unknown cost of highly specialised supervision. They found it hard to believe that this was a practical method of dealing with peak loads. It was even suggested that it might be preferable to consider electrical carbonisation using off-load current.

But there seem to be at least two other major objections, not so much to the scheme itself which, as we have said, is not without its attractions. The first is that it promises nothing in the way of reducing the growing quantity of coal annually required by the gas industry. Attention has been called in the most authoritative quarters to this alarming growth. It is occurring, of course, in several other directions. If methane is to be made for enrichment from indigenous raw materials, surely it should, and could, be made, not indeed without coal but from such coals or fuels as cannot readily be used for orthdox gas-making. The second objection is that there are directions in which the use of the limited capital allocation to the gas industry might be more profitably employed.

Are there not processes awaiting full scale trial and development which have already been brought up to that stage by the Gas Research Board? Here we have a proposal from outside the industry calling for the expenditure of nearly half a million pounds while there are several processes already established at the semi-scale stage within the industry which only need some generous and adventurous expenditure to achieve success. And some of these, the synthesis of methane using coke or coke breeze, methods of gas-making from weakly-coking coals, would definitely increase the range of fuels available to the industry. Apart also from gas-making processes there are several other problems before the industry which could be brought to a successful conclusion with the application of a moderate amount of capital. A number of these will occur to everyone—the removal of organic sulphur from gas supply, new methods of removing hydrogen sulphide from crude gas with the recently suggested possibility of recovering sulphur in a pure form from the purifying materials, the profitable use of ammonia.

One further objection to this proposal is the implication of an increase in the calorific value at which gas would have to be made. This would be a backward step. An all-round reduction of calorific value, at least to the point of optimum coal and plant economy in each locality, would save coal and capital expenditure. In the present situation of war preparation such a step would only be less justifiable than in wartime itself. Finally, in their opening sentence the authors of this paper under-rate the flexibility possessed by the gas-making processes now in use. Output from most varieties of plant can be varied over a wide range of quality and quantity. Several types of peak load plant are economically in operation. We are developing oil gasification. We can look forward in the next 20 years, say, to an increase in the quantity of tail gases which will be produced in the great oil refineries which will be set up in this country as they have been on the Continent. But most of all we want to be allowed to bring to fruition those numerous processes developed within the industry which are awaiting a full-scale trial.

While we do not wish to detract in any way from our appreciation of the good intentions and excellent presentation of this new suggestion for increasing the storability of therms, it is a question whether this is the time to promote any considerable capital expenditure which does not contribute something definite to the coal economy of the industry or to its overall economic efficiency.

FLYING SAUCERS

NESTLING beneath the Dome of Discovery is the very object of months of investigation and research. Test pilots and gremlins may now fly the skies unmolested. The flying saucer has at last been captured. We feel it our duty to inform the world that a company advertising throughout years past in our pages has now released its secret. We wonder—was this all a publicity stunt? We do not think so. We are under the impression that a high-pressure salesman has been covering the miles and defying supersonic speeds and sound, and taking a commission on the number of visitors he brings to the South Bank. However, it is our pleasure to announce that as soon as the salesman was shackled the sun came out. We reproduce in our pages this week a picture of this fabulous, futuristic phenomenon.

WATTLE AND DAUB

IN the streets and buildings of our old towns much of the history of our land has been written. While the passage of the years has left its mark on the ever-changing face of England, there is in our ancient buildings a feeling of changelessness which no modern mass of stone and steel can give. In them we sense the spirit of a more peaceful, more expansive era, which has persisted down the years as an example to a 20th century world become confused.

For this reason we like the newly renovated gas showrooms at Stratford-on-Avon—described and illustrated on later pages of this issue; and if we have chosen a slightly flippant title for this short note it is because such titles attract attention, and we believe that attention should be drawn to this praiseworthy effort by the West Midlands Gas Board. In these premises are combined modern gas service and the traditional atmosphere which surrounds the birthplace of the 'immortal bard.' The quite extensive alterations have been carried out with taste and discretion which is wholly commendable—unlike so many ersatz

'Olde Worlde Tea Shoppes' and pseudo Tudor abominations which attempt to preserve an atmosphere which probably never in fact existed at all. And thankfully we note that the Gas Board has resisted the temptation to clothe (as many occupiers of such premises might have done) its showroom attendants in fancy dress of doublet and hose or ruffle and stomacher. There are no immitation painted timbers; no artificially drilled worm holes. There is, indeed, no need for such devices, for the building is genuinely 16th century with all the subtle beauty of line which gave Elizabethan architecture a charm which many seek to copy today. If any proof of genuineness were needed it would be in the curious arrangement of the upper floor, which extends half way over the next-door premises to compensate for a similar trespass by the bedroom of the neighbour the other side. Within the showroom there is left exposed a section of the original wattle and daub wall, which must surely be unique in gas showroom construction.

The West Midlands Gas Board has in its Stratford-on-Avon showrooms not only enhanced the dignity of the industry and the service it represents, but has preserved for posterity an echo from a bygone age which we should be the poorer for losing.

Letters to the Editor

JOINT CONSULTATION

DEAR SIR,—In recent years there has been an increasing acceptance of the principles of joint consultation in almost every sphere of British industry, as is shown by the widespread establishment of joint production committees, works councils, and similar bodies.

I am engaged in research into the scope and methods of joint consultation at the factory level, and in view of the public interest which this subject has aroused I feel that some of your readers might make a valuable contribution to my work from their own practical knowledge and experience in this field. I would be very grateful to receive details of any scheme of joint consultation in operation in any type or size of industrial establishment; such information would be used solely for academic purposes and would of course be regarded as strictly confidential.

Yours faithfully,

JOHN REDFERN, B.COM.,
Research Assistant.

Department of Commerce,
University of Edinburgh.
April 30, 1951.

DEATH OF GAS RESEARCH BOARD

DEAR SIR,—The Gas Industries Committee of the Association of Scientific Workers is deeply concerned at the proposal to close down the Gas Research Board. The existence of research associations responsible jointly to the D.S.I.R. and to the industry with which they are associated has proved a most valuable asset to scientific progress, and the Gas Research Board, although a relatively young organisation, has already shown its worth. Outstanding contributions to a scientific understanding of the gas industry's problems have already been made.

There is already a tendency for overmuch power to be concentrated in too few hands in the gas industry, and if the Gas Research Board is to be replaced by an organisation directly under the Gas Council the measure of independence which has been enjoyed up till now will be ended. The nationalisation of the coal industry did not lead to the extinction of B.C.U.R.A., which occupies a somewhat analogous position to the Gas Research Board and is still carrying on its good work.

We think that the time taken to establish a scientific institution such as the Gas Research Board is often overlooked. A team of scientific workers can only be established over a period of years; abstract systems have to be organised, apparatus obtained, laboratories fitted. Most important of all, the scientists themselves have to be enlisted and apportioned suitable work; the team spirit takes time to develop.

Consequently, the closing down of the Gas Research Board can only mean a serious set-back to scientific development. Moreover, by the taking away of all responsibility from the D.S.I.R. and the gas appliance manufacturers for this work, a dangerous concentration of power into the hands of a few men must be feared.

Yours faithfully,

T. AINLEY.
General Secretary.

Association of Scientific Workers.
15, Half Moon Street, W.1.

Personal

Mr. C. A. Lewis, A.M.I.P.E., General Manager of Radiant Heating, Ltd., was recently elected to the Board of Directors. Mr. Lewis joined the Company in 1928.

◆ ◆ ◆

Mr. Colin Norton-Smith has taken up his appointment with the East Midlands Gas Board as Editor of *EMGAS*, the house magazine of the Board. Mr. Norton-Smith will also be responsible for Press Relations. Mr. Norton-Smith was Assistant Editor of *Contact*, the house magazine of the Watford Division, Eastern Gas Board, previous to which he served on the editorial and public relations staff of a national monthly for a number of years.

◆ ◆ ◆

Mr. William Foster has been appointed to the Board of J. H. Robinson & Co. (Liverpool) Ltd., with effect from May 1. He has resigned his position as Outside General Sales Manager, Creda Division, Simplex Electric Co., Ltd., to take up his new duties. Previous positions include those of Manager, North Western Area, and Manager, North of England, Scotland and Northern Ireland. Mr. Foster's family has long been associated with the gas industry. His grandfather was gas engineer at Nelson, Lancashire, for several years towards the end of the last century, and he is the nephew of the late Mr. John Foster, Engineer-in-Chief, Birmingham, from 1919 to 1929. Mr. Foster served in the war in the R.A.F., latterly in troopships, and attained the rank of Wing Commander.

◆ ◆ ◆

Professor **Frederic Horace Garner,** O.B.E., PH.D., M.I.MECH.E., F.R.I.C., F.INST.PET., F.S.A., Director of the Department of Chemical Engineering of Birmingham University, has been appointed a part-time member of the West Midlands Gas Board. He has had a distinguished career and wide experience in the field of chemical engineering, is a member of the Fuel Reserch Board, and has been a member of the Ministry of Fuel and Power's Scientific Advisory Council since its formation. He will take the place of Mr. A. W. Smith whose term of office expired on April 30. Mr. Smith had already retired from the general managership of the Birmingham Corporation Gas Department before the industry passed to national ownership and has served on the West Midlands Gas Board since it was set up.

Obituary

The death has occurred of **Mr. Oswald H. Wass,** Chief Sales Representative of General Refractories, Ltd., Sheffield. Mr. Wass had been with the Company since 1924.

Diary

May 10.—Midland Junior Gas Association: President's Day.

May 11.—Northern Junior Gas Association: Meeting at Newcastle; visit to Redheugh gasworks and address by J. R. Bradshaw.

May 12.—Scottish Junior Gas Association (Eastern District): Annual General Meeting at Edinburgh.

May 15.—Eastern Gas Consultative Council: Connaught Rooms, Great Queen Street, 2 p.m.

May 16.—Institution of Gas Engineers (South Western Section): 'Some Thoughts on the Treatment and Disposal of Gasworks Effluent,' Dr. A. Marsden, Torquay.

May 17.—Gas Council Commercial Managers' Committee, Leeds. 10.15 a.m.

May 18.—London and Counties Coke Sales Circle: Annual General Meeting Gas Industry House, 2.30 p.m. (Extraordinary General Meeting at 2.15 p.m.)

May 18.—Institution of Chemical Engineers: 29th Annual Corporate Meeting, May Fair Hotel, London, 11a.m.; Presidential Address, 12 noon; Annual Dinner, 7.30 p.m.

May 19.—Scottish Junior Gas Association (Western District): President's Day; Visit to Dumbarton gasworks.

May 19.—Western Junior Gas Association: Visit to the works of the Gloucester Aeroplane Co., Ltd., Gloucester.

May 22.—Institution of Gas Engineers (London and Southern Section): Spring General Meeting.

May 22.—Women's Gas Federation: 16th Annual General Meeting, Caxton Hall, Westminster.

May 26.—Eastern Junior Gas Association: Annual General Meeting, King's Lynn.

May 29-June 1.—Institution of Gas Engineers: Annual General Meeting, London.

May 31.—North Thames Gas Consultative Council, Westminster City Hall, Charing Cross Road, 2.30 p.m.

June 9.—Midland Junior Gas Association: Ladies' Day; Visit to Pottery Works, Stoke-on-Trent, and Trentham Gardens.

June 9.—Scottish Junior Gas Association (Eastern District): Annual Outing, Forfar.

June 9.—Manchester District Junior Association of Gas Engineers: 'The Economics of Gas Manufacture,' M. Redman (North Western Gas Board); Visit to the works of W. C. Holmes and Co., Ltd., Huddersfield.

June 11.—West Midlands Gas Consultative Council: Dudley Room, Queen's Hotel, Birmingham, 2.30 p.m.

June 11.—Nalgo Conference: Meeting of Gas Staffs, Blackpool, 9.30 a.m.

June 11-12.—Institution of Gas Engineers (Eastern Section): Annual Meeting, Royal Hotel, Lowestoft.

June 15.—Institution of Gas Engineers (Midland Section): Summer Meeting and Chairman's Day, Oxford.

INSTITUTION OF GAS ENGINEERS

THE 88th annual general meeting of the Institution of Gas Engineers will be held in London from May 29 to June 1 under the presidency of Mr. F. M. Birks, C.B.E., Deputy Chairman of the North Thames Gas Board. Following is a summary of the programme.

Tuesday, May 29:

10 a.m. Opening: Presentation of Medals.
10.25 a.m. Presidential Address.
11 a.m. Paper on 'The Development of Gas Production in Belgium: 1900-50,' by M. Brabant, President of the Belgian Gas Association and of the International Gas Union.
1 p.m. President's Luncheon, Savoy Hotel.
3 p.m. Symposium of Short Papers submitted by the British Junior Gas Associations' Joint Council.
8 p.m. Reception and Dance, Connaught Rooms.

Wednesday, May 30:

10 a.m. Paper on 'Some Aspects of Gas Manufacture Practice in the North Thames Gas Board,' by J. Burns, G.M., Chief Engineer.
11 a.m. Benevolent Fund.
11.15 a.m. Paper on 'Some Considerations relating to the Storage of Coal and Coke in the Gas Industry,' by L. J. Clark, B.E.M. (Assistant to the Chief Engineer), and J. H. Walker (Assistant Mechanical Engineer, Beckton), N.T.G.B.
1.30 p.m. Visit to Beckton.
1.40 p.m. Visit to Watson House.
1.40 p.m. Visit to the Harlesden works of McVitie and Price, Ltd.
1.50 p.m. Ladies' visit to the Zoo.

Thursday, May 31:

10 a.m. Paper on 'Horizontal Retorts,' by J. E. Davis, Chief Technical Officer, and C. Stott, Deputy Chief Engineer, Metropolitan Division, S.E.G.B.
11 a.m. Paper on 'Distribution Development in the Western Area of the North Thames Gas Board,' by A. D. L. Copp, Joint Assistant Distributing Engineer, N.T.G.B.
12 noon. Concluding business.
12.45 p.m. Council Luncheon to the President, Goring Hotel.
1.30 p.m. Visit to the East Greenwich works of the S.E.G.B.
1.40 p.m. Visit to the Brentford works of the N.T.G.B.
1.40 p.m. Visit to the Dagenham works of Briggs Motor Bodies, Ltd.
1.40 p.m. Visit to the Harlesden works of McVitie and Price, Ltd.
4 p.m. Ladies' Tea Party, 17, Grosvenor Crescent, S.W.1.
8 p.m. Concert, Royal Festival Hall.

Friday, June 1:

Visit to Sussex Coast.

The S.B.G.I. Golfing Circle summer meeting will be held at Roehampton Club on May 28, when members attenting the Institution Meeting are invited to participate in the competitions for the Thornton Victory Cup (for S.B.G.I. members) and the Coronation Plate (for Institution members). Entry forms are returnable to the Hon. Secretary, W. Morland Fox, 28, Victoria Street, S.W.1.

DUCTS FOR SERVICES

The Council for Codes of Practice for Buildings has now issued in final form Code 413, 'Design and Construction of Ducts for Services.' This code was previously issued, as a draft for comment, as Code 304, 105, 'Design and Construction of Pipe Ducts,' but it was decided to enlarge the scope to include ducts for all services besides pipes. The code was revised before publication by a Committee convened by the Institution of Mechanical Engineers on behalf of the Council.

The code deals with the design and construction of all forms of ducts for the accommodation of pipes, cables, etc., within and adjacent to buildings. With regard to preliminary exchange of information, the importance of early and thorough co-operation between the various parties concerned is stressed—especially with a view to the possible future extension or alteration of the services required. Notes are included on the preparation of a time schedule, and a list gives the relevant British Standards appertaining to the materials required in the construction of ducts.

The types and arrangement of ducts, chases, trenches, and subways to suit the various requirements of the services they carry are described in considerable detail. Guidance is given on the methods of, and materials for, construction; and details are set out regarding the access arrangements, suppression of noise, avoidance of transmission of heat, and, in particular, the precautions necessary to ensure that the system of ducts does not increase the fire risk in a building.

The code concludes with recommendations on inspection and general maintenance of the completed ducts, and there are some illustrations showing the construction of typical vertical and horizontal ducts, crawlways, and subways.

The code carries the usual warning that, during the present abnormal conditions, it may not be possible to carry out all the recommendations.

Copies of the code may be obtained from the British Standards Institution, 24, Victoria Street, London, S.W.1, price 3s. post free, reference CP413(1951).

News in Brief

Recent Improvements and alterations at Aberdeen gasworks were shown to the members of the North District Committee of the Gas Consultative Council last week. Mr. H. S. Milne (Divisional Controller) and Mr. J. Cordiner (Assistant Manager) took the party round.

Cooker Television.—To facilitate the deliberations of the House of Commons on the recent Beveridge Report and to demonstrate to members of the House that sponsored television in this country would be unlike the popular conception gained from American films and contemporary burlesque, Pye, Ltd., recently arranged a demonstration television programme on sponsored lines and transmitted it from the London Studios of City Film Productions direct to the Grand Committee Room of the House of Commons, where it was viewed on a number of television screens by the assembled Members. The demonstration comprised a 30 minute programme, and Philip Harben, in a simple cooking demonstration, used a Main 177-16 gas cooker.

'I Heat This' is the caption of a striking double crown poster prepared by the South Eastern Gas Board depicting Mr. Therm pointing proudly at the Royal Festival Hall on the South Bank site of the Festival of Britain. Attention is prominently drawn to the fact that this is the largest gas installation of its kind in the country. Other publicity material by the S.E.G.B. includes special window displays with the same message as the poster, associating gas with the Festival theme.

Two Recent Publications by the Purchasing Officers' Association (Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4) are: No. 17, 'Chemicals and Fertilisers' by F. Richard King (price 3s. 6d.) and No. 18, 'Raw Materials of the Refractories Industry' by R. J. Mitchell (price 2s. 6d.).

Shortage of Labour has made it impossible to adjust all prepayment meters in Lanarkshire since the recent rise in price of gas. Housewives in some areas are thus using more gas than is covered by the money inserted in the meters, and are being asked to pay the difference when the collector calls. This they are refusing to do on the ground that the fault lies with the Gas Board in failing to adjust the meters to the new rate. In Lanark the Provost has advised housewives to make official protest to the Town Clerk with a view to having the situation ventilated.

THE B.I.F. INDUSTRIAL GAS CONFERENCE

THE undoubted success of the B.I.F. Industrial Gas Conference on April 30 received comment in last week's *Journal*, p. 280. We now publish three photographs taken on that occasion. **Above:** Mr. F. A. Hooper, Chairman of the Society of British Gas Industries, speaking at luncheon, with on the left, Alderman J. C. Burman of Birmingham, principal speaker at the Conference, and Sir Edgar Sylvester, Chairman of the Gas Council; on the right is Sir Andrew Clow, Chairman of the Scottish Gas Board. **Left:** Viewing the special exhibit of burners designed by the North Eastern Gas Board for the Gas Council stand. In the centre of the group is Dr. Roger Edwards, Chairman of the North Eastern Gas Board, and on the left, Mr. Norman Hudson, the Board's chief commercial officer. **Right:** Mr. G. le B. Diamond, Chairman of the West Midlands Gas Board, with Dr. Harold Hartley.

Eastern and Midland Juniors

Joint Meeting at Luton

CREDIT must go to the Eastern Junior Gas Association for suggesting that they might join forces with the Midland Junior Gas Association, and thus get to know each other. Equally laudable was the Midland Juniors' prompt acceptance; and on April 18 the two Associations met and mingled within the pleasant aura of hospitality extended by Electrolux, Ltd., and Skefco, Ltd.

On arrival at Luton, the Electrolux contingent was welcomed by Mr. F. L. Woodcock, Gas Liaison Officer, and Mr. George Smith, Personnel Manager, and the morning was spent inspecting the manufacture of suction cleaners.

Electrolux Works

The visitors were entertained at lunch at the George Hotel, Luton, and in the afternoon, toured the section of the factory devoted to the manufacture of refrigerators. In the hands of competent guides, they had every opportunity to study the modern production methods employed in this exceptionally clean and well-equipped factory. Among the sections visited were the press and machine shops where the various parts of the refrigerator cooling unit were fabricated ready for assembly. The raw material was mainly mild steel tubing and the operations included mechanical sawing, hand and power cold bending, and press and drilling operations. The expanding machines, which fix the cooling fans to the condenser tubes were of particular interest.

In the welding, testing and insulating shops the refrigerator cooling unit took shape. The components were jig assembled and all joins oxy-acetylene welded, and the gradual growth of the unit, through its various stages was noticeable. The completed unit was tested for leaks by filling with compressed air at 850 lb. per sq. in. and spraying with a soap solution. Having passed this test, the unit was ready for filling with the refrigerant, and then painting and insulating. It was afterwards placed on the overhead track which caried it forward to the assembly shop.

In the press and machine shop and sheet metal shop the various parts of the refrigerator, cabinets and interiors, as well as certain parts for the suction cleaner, were pressed from sheet metal into requisite shapes on machines varying in capacity from 5 to 500 tons, the latter figure being the capacity of a newly-installed monster. After being cut to size on the guillotines, various bending and piercing operations also took place, and in the sheet metal shop various finishing processes were undertaken. After thorough inspection the parts went forward, after a grease-removing process, to the porcelain enamelling department or paint shop. In this interesting department a coating of glass enamel was sprayed and fused on to the metal parts (in some cases the parts were completely dipped), placed on the moving track, and after passing through a drying oven were carried through the continuous fusing furnace back to the spray booths where they received a further sprayed coat, and again passed through the drying oven and furnace. The finished components then met and were assembled on a slowly-moving track; and after final test were ready for packing and despatch.

Later, visitors to both factories met at the Leicester Arms Hotel where they were the guests of the Eastern Gas Board.

Mr. G. Davies (Great Grimsby), President of the Eastern Juniors, explained the circumstances which had led to this joint meeting and said he hoped that it was the first of many.

Ball Bearings

The President of the Midland Juniors, **Mr. J. Palser** (Birmingham), echoed these sentiments and recalled that it was four or five years since his Association had enjoyed a joint meeting with the Manchester Juniors at Stoke. Such functions, he thought, should become annual events. There was a difference between the two Associations in that the Midland Juniors had no area boundary, their members being drawn from four area boards. Those, like himself, who had inspected the Skefco works, would remember it for a long time as being a visit of exceptional interest. In his own 30 years' experience of visiting factories he had never before seen ball bearings made. It had been a revelation to see the degree of accuracy employed, and he offered the thanks of all who had visited the factory to Mr. Palmer and Mr. Wright, the two Directors of Skefco, Ltd., who were present.

The vote of thanks was seconded by **Mr. A. D. Duxbury** (Peterborough), Assistant Secretary of the Eastern Juniors.

The thanks of the visitors to Electrolux was voiced by Mr. Davies. He had, he said, been selling refrigerators for 20 years, yet this was his first visit to Luton. All those who had seen the factory were impressed by the care taken in assembly and testing.

Mr. Woodcock briefly replied.

Mr. R. B. Watkins (Coventry), Senior Vice-President of the Midland Juniors, then thanked the Eastern Gas Board, and in particular Mr. T. C. Battersby, General Manager of the Watford Division, for the hospitality extended to them.

Replying on behalf of Mr. Battersby, who was unable to be present, **Mr. W. A. Evetts, M.C.**, Divisional Engineer, spoke of their pleasure at having two Associations visiting the area, and hoped that they would come again in the near future.

DIETERICHS MEMORIAL

Our photograph shows the Dieterichs memorial plaque in the industrial workshops at Watson House. This was subscribed for by employees at Watson House, and the metal plaque was the door of a muffle furnace in which Mr. Dieterichs had a great interest. The plaque was unveiled by Mr. Jim Stiles, foreman moulder and one of the oldest members of the industrial workshops.

Purchasing Officers' Association

The Purchasing Officers' Association, whose 2,700 members all hold responsible purchasing appointments in industrial and public undertakings, is organising a Scottish and North of England one-day conference at the North British Station Hotel, Edinburgh, on Saturday, May 19. The National Council of the Association will be meeting at the same hotel on the preceding evening, and many of the Association's leading personalities will, therefore, be attending the conference.

The programme will include papers on 'The Purchase of Castings' by Mr. F. J. White, of Chance Bros., Ltd., and on 'Economic Efficiency' by Mr. A. Elliott, of the Churchill Machine Tool Co., Ltd. There will be an 'Ask Your Questions' session in the form of a brains trust on purchasing topics, with members of the National Council forming the team, and group discussions running concurrently will consider such subjects as reciprocal trading, material controls and priorities, and purchasing publications.

Although the conference is primarily intended for members of the Association's branches in Scotland and on Tyneside, any other purchasing officers will be welcome to attend, and should apply for tickets to the General Secretary of the Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Future of Education and Research

Colonel H. C. Smith Explains Gas Council Policy

An important statement on the policy of the Gas Council in regard to its relations with the Institution of Gas Engineers and the Gas Research Board was made by Colonel H. C. Smith, Deputy Chairman of the Gas Council, at the East Midlands Gas Board Staff Conference at Skegness on May 4.

COLONEL SMITH said there were two matters he wished to talk about. The first was the relationship between the Gas Council and the Institution of Gas Engineers. There had been an impression in some quarters —he had seen it recorded in the Press— that the Institution of Gas Engineers had lost its independence on account of nationalisation and it was stated, in fact, that the Institution of Gas Engineers had now got to do what it was told by the Gas Council. He wanted to put that absolutely right and to deny it most emphatically.

The Institution, of which he was proud to be a past-President, was an independent professional body dependent on nobody but its own members, and in his view the Council of the Institution took entirely the right stand when nationalisation was proposed and the Gas Bill was being considered, in deciding that they were right outside the provisions of the Bill and that therefore the line they should take was that the Institution was a professional body which was there to assist in the training of gas engineers, to look after the interests of gas engineers, and to assist the industry in every way it possibly could. Since vesting day the Institution's attitude to the Gas Council had been entirely that of a body available to advise and help the Gas Council, but that was entirely of its own volition.

It was true that the gas industry contributed to the finances of the Institution but in doing that through the Gas Council it was only paying for services rendered to the industry by the Institution. There was no question of the Gas Council being able to say 'We are giving the Institution a donation and therefore we must ask the Institution to do certain things for us.' Payment was made in respect of services rendered.

The Institution was responsible for running an education scheme for training and qualifying gas engineers. The Gas Council and the area boards now had the responsibility for dealing with questions of education but having set up an Education Committee of its own it quickly decided that the Institution's Education Scheme was so well established that there was no need for it to be interfered with. Therefore, so far as technical education was concerned, the Institution was looking after that for the industry.

At the headquarters of the Gas Council they had not set up a large staff. What they had done was to say to the Institution 'Will you act as our technical advisers for this,' and when technical problems came to them to which they had to give answers, they had made arrangements with the Council of the Institution to set up small panels of specialists and the questions were referred to the Institution who, through the panels, provided the information on which they could give the answers.

As the result of the visits made by the Chairman and himself last year it became increasingly obvious that the technical training schemes which the Institution had evolved were not quite sufficient in themselves for satisfying all the demands likely to be made in the future. In the area board organisations now being set up in the gas industry they had a new officer, or new types of officer. Therefore, quite obviously they would need in the future some training in general administration which should be available to the Divisional General Managers and Group General Managers. They were the men to whom the area boards would, of necessity, have to look for the administering of the divisions and groups. The Council of the Institution of Gas Engineers had always seen the need of the future and he hoped it would be possible for them to include, in their syllabus for training, some provision for this further knowledge on administration.

Research Controversy

The second matter he wished to talk about was research. There had been quite a controversy dealing with this important matter. The question had been asked 'What is the Gas Council going to do about research. It appears to be throwing over the only co-operative body we had in the industry dealing with research, *i.e.*, the Gas Research Board,' and it was suggested that a complete mess was likely to be made of research in the future. The Gas Act provided that the Gas Council should be responsible for developing research and it had to prepare a programme for the Minister's approval. Careful consideration was given to this question and they took the advice of some of the most eminent scientists in this country. A small Research Advisory Committee was formed to advise the Gas Council as to the best method to be adopted in the future. They had on that Committee Sir Robert Robinson, (past-President of the Royal Society), and Sir Cyril Hinshelwood, two of the most eminent scientists in this country, and after full discussions and the most detailed consideration, it was decided, in view of the responsibility placed on the Gas Council, that the Gas Research Board, as it was constituted, was not the body to whom should be entrusted the major problems of research in the industry.

They were able to arrange to take over the research laboratories which were set up by the old Gas Light and Coke Company, which were now being operated by the North Thames Gas Board, and those laboratories were becoming the first Research Centre of the Gas Council. Dr. Hollings had been designated Director of that Research Laboratory and he would act through his Area Board on behalf of the Gas Council. A second research centre would shortly be opened and possibly, at some later stage, a third centre. A comprehensive programme of research had been prepared as the result of a review of all the research that was being conducted in the industry, and it was now being submitted to the Minister for his approval. Some parts of that programme were considered to be of very great importance and work would be stepped up and speeded up in some of these very important items. He was sure that that work would go along much more quickly than would have been possible under the old research organisation.

Some people might say 'Why interfere in any way with the Gas Research Board?' There was no reason from the Gas Council's point of view why the Gas Research Board should not have continued to exist, but without the major financial support of the Gas Council this was not found to be practicable.

Therefore, for the reasons given, the Gas Council had to decide otherwise. The Gas Research Board, as indicated in the report issued at its last annual general meeting, was likely to disappear. Unfortunately he had been asked to be Chairman of the Gas Research Board 'as an undertaker.' He did not like the description, but having accepted that position he knew what he was taking on and must put up with any of the descriptions that might be applied to the new Chairman of the Gas Research Board. One thing the Gas Council had done was to assure the staff of the Board that, if they wished they would be taken over and that their conditions of service would be no worse than they were with the Gas Research Board. Moreover, they were doing everything they possibly could to see that there was no 'let up' in the actual work of the Gas Research Board and they hoped the change would be made at least as smoothly as was the change from private enterprise to nationalisation of the industry itself. There would be no diminution in the co-operation between the Gas Council's Research Committee and the makers of appliances and the contractors. His own belief was that that co-operation would be strengthened and that they would have closer working with them even than they had had in the past. Further, there would be no diminution in the co-operation between them and other research organisations and scientific bodies.

HOME SERVICE DISCUSSION GROUP

THE Home Service Advisers' Discussion Group of the South Western Gas Board held its quarterly meeting at Swindon on April 27.

Assembling in the demonstration hall in Temple Street at 10 a.m. they were welcomed by Miss Christine Pollard, Home Service Adviser at Swindon, who, as Chairman of the meeting, introduced Mr. W. B. Claridge, M.Inst.GasE., Manager of Swindon Sub-Division, to her colleagues. Mr. Claridge also welcomed the visitors, including Mrs. Eileen Murphy, Home Service Officer of the Gas Council and wished them a useful and successful meeting.

The programme included a session for discussion of home service problems on the district, an address on 'World Food Problems,' by Mr. G. Cuncliffe, B.Sc., Staff Tutor in Natural Science for Adult Education, a talk by Miss Forth of the Swindon Education Department on 'Requirements of the Modern Domestic Subjects Room', illustrated by plans of some recent class rooms for which she had been responsible. There followed a lively discussion and exchange of views.

After luncheon, at which Mr. Claridge was host, there was a practical demonstration by Mr. L. Moon, Tutor and Catering Officer, Cheltenham Technical College. Mr. Moon's syllabus included definition of the fine arts of cookery, difficulties in teaching cookery, sick room cookery, a demonstration showing dishes correctly and incorrectly cooked and served, a demonstration of poached fillet sole with sauce, and a demonstration of ice cream making. The latter which contained 3 pints of milk, 10 eggs, and 12 oz. of sugar, was consumed by the audience during tea and was voted by the young Home Service Advisers to be the best ice cream ever tasted, and by the older ones, the best since 1939!

Safety Exhibition in Birmingham

The Birmingham and District Industrial Safety Group has organised an exhibition to be held from May 30 to June 2, in the Bingley Hall, Birmingham. More than 50 stands will be occupied by firms manufacturing industrial safety and factory welfare equipment, including machine guards, fire fighting appliances, protective clothing, goggles, etc. This is the first large scale exhibition dealing with industrial safety to which the factory worker will be invited in addition to all grades of supervision, from chargehands to works managers and directors.

Members of the Birmingham and District Group will exhibit ideas developed and used in their own factories, and a large stand will be devoted to this aspect of non-trading exhibits.

Further information regarding the exhibition can be obtained from the Hon. Secretary, Mr. A. G. Cogswell, Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham, 24.

Festival Fare in the West Midlands

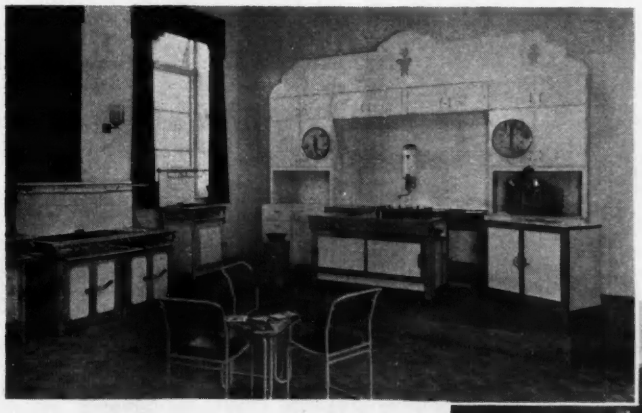
The West Midlands Gas Board gave the Festival Fare Cookery Competition an enthusiastic send off with the publicity section, home service advisers, sales and service officers and showroom staffs combining in a strong publicity drive.

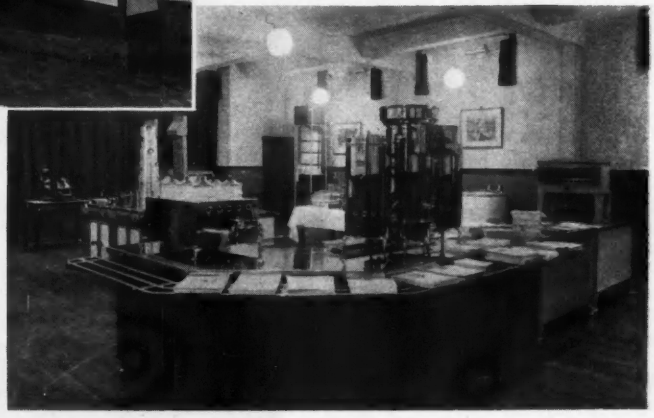
A striking display was designed and circulated to every showroom in the area and slides spelled the message to cinema-goers. Demonstrations at the branch offices included the county fruit cake among the dishes to show the audience that the recipe was both easy to make and tasty to eat—as indeed it is. In Press advertisements original layouts as well as the official block was used, and the Gas Council red and blue leaflets had wide distribution through various channels.

The dates for the district finals are fixed and the prizes for the Birmingham and District Division will be presented on June 5 by Mrs. J. E. Wakeford, wife of the Divisional Manager. Then, on June 28, the area final will be 'cooked off' in Birmingham in a floodlight of publicity. Dame Vera Laughton Mathews, D.B.E., has kindly agreed to present the prizes.

A Regulo Stimulus.—Writing on cooking in *Electrical Industries* Mr. W. E. Warrilow suggested that the introduction of the Regulo—'that ingenious and effective device'—has given a new lease of life to gas cooking.' He went on to argue that the electrical answer has been found in the 'simmerstat.'

Catering Exhibition Tours the South Western Area





Torquay's Gastronomic Festival was referred to in the *Journal* of March 21 (page 721). So much interest was provoked by the exhibition of large-scale catering apparatus arranged in conjunction with the Festival that it was decided to repeat the exhibition at various other towns in the Southern Division. Here we illustrate it as it appeared at Exeter from March 14-22. Other places visited were Truro and Ilfracombe. The fullest co-operation was offered by the manufacturers, and the results of the effort are regarded as highly satisfactory.

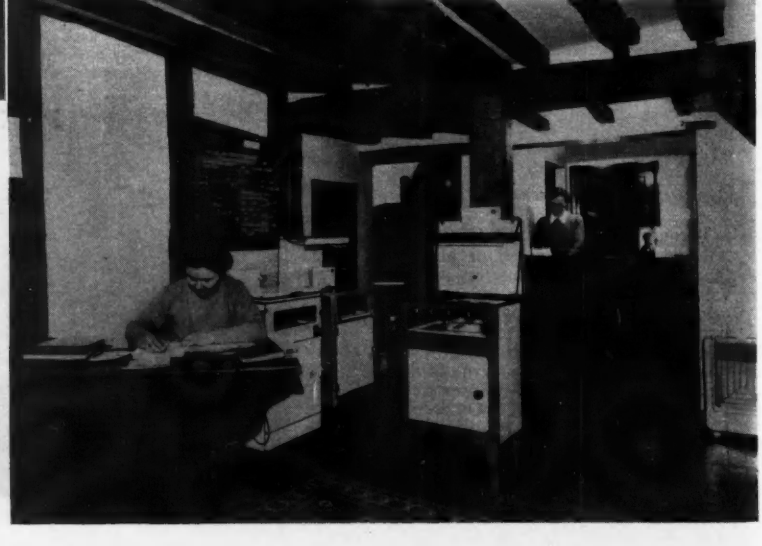
A LINK WITH SHAKESPEARE

Stratford-upon-Avon Showrooms Preserve Historic Atmosphere

The reconstruction and enlarging of the Stratford-on-Avon gas showrooms presented a unique opportunity for a sympathetic link-up of sixteenth century traditional atmosphere with the modern gas service. Advantage was taken of this opportunity to fall in with the often expressed wishes of the local Council that reconstruction should be in keeping with the William Shakespeare background.

A DESCRIPTIVE note by Mr. Levi Fox, M.A., Director of the Trustees and Guardians of Shakespeare's Birthplace, indicates that the gas showrooms in Wood Street form part of an interesting old two-storied building which was once the home of William Parsons, woollen draper and Alderman, and a contemporary of Shakespeare. The building dates from the beginning or middle of the sixteenth century, and its story follows a similar pattern. It may have suffered from one of the fires so prevalent in Elizabethan Stratford, but, if so, the damage was made good. A century and a half later, when timber-framed exteriors fell into disfavour, it was refaced with brick and plaster. Many of the old houses which underwent this treatment in Stratford were stripped and restored in the early years of the present century, but in the case of the gas showrooms, this was not done until the 1920s. Many Stratfordians will recall the former appearance of these premises, when a plaster front covered No. 27 and the adjoining property to the corner of Rother Street.

As now seen, the lower storey of the showrooms has been necessarily altered by the insertion of a modern shop window, but otherwise the original appearance of the building has been preserved

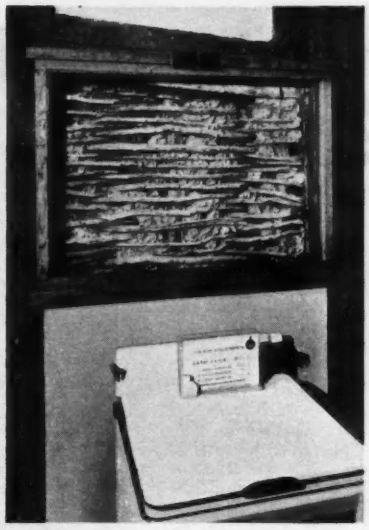


as fas as possible—for example, the projecting upper storey and early close-set vertical timbers.

This has been Corporation property from the beginning, and William Parsons had a lease of it in 1580. Fifty years later it had passed into other hands and was already divided, and occupied by three or four under tenants. In more recent years the premises which became the gas showroom have been used for a variety of business purposes. In the 1880s they were occupied by George Knight, a tin-plate worker, in 1900 by Walter Hathaway, a butcher, and in 1914 by Thomas Kelly who sold fruit. Kelly's tenancy lasted into the 'twenties. Finally, in 1928, the Stratford-on-Avon Corporation Gas Committee took over the premises for the present purpose.

The occupiers of the first floor have, through the centuries, arranged their accommodation in an unusual fashion. A shoe repairer on the left encroaches his bedroom half over the gas showroom's shop front, and the first floor of the showroom is half over the jeweller's shop on the right.

Part of the original wattle and daub construction of the building has been retained and framed as an exhibit, which is probably unique in the annals of gas showrooms. This can be seen in the accompanying illustration.



Part of the original wattle and daub construction of the Stratford-on-Avon showrooms preserved as a framed exhibit.

The ground floor, for sales and accounts, has had its tone successfully retained and at the same time the space of off-white plaster is in keeping with the enamelled gas appliances. A new extension to the rear of the premises on the first floor comprises a hot water section, demonstrating a comprehensive battery of water heaters and washing machines.

The 16th century room overlooking the street on the first floor has been enlarged by the removal of an old oak screen to permit of the activities of the home service advisers, meetings of the Women's Gas Federation, etc.

The Stratford-on-Avon district gas showrooms now re-opened for appliance sales and payment of accounts are a credit to the vision, planning, and energy of the Engineer and Manager, Mr. Tomlinson Jones, who has combined in the premises a sound utilitarian value and a true 16th century background.

MAKING THE MOST OF LITTLE SPACE

Birmingham's New Branch Office

The West Midlands Gas Board, always alive to the needs of consumers, has opened a new branch office at Great Barr in the Birmingham district. Situated on the main Birmingham-Walsall Road, near the meeting point of three districts, the branch offers gas service to a population of some 3,500.

THE new Great Barr gas showrooms are lock-up premises measuring no more than 16 ft. by 28 ft., but the fullest advantage has been taken of the limited space available to provide a service centre which, despite its small size, fully conforms to the high standards set by the West Midlands Gas Board.

An 'open' type window gives a clear view of the interior from the street, and a representative selection of domestic appliances has been so arranged as to minimise any suggestion of overcrowding. A water heating display occupies a prominent position on the rear wall.

A tasteful scheme of decoration completes an overall effect which proves that spaciousness is by no means essential to good service from the gas showroom aspect.

Notable Gathering at Dunblane

Right: *This 'Gas Journal' photograph, taken on the entrance steps of the Dunblane Hotel Hydro shows left to right: Mr. R. Sturrock, Immediate Past President, Mr. J. R. W. Alexander, Executive Chairman of the Gas Officers' Guild, Mr. F. R. Mitchell, President of the North British Association, Dr. W. T. K. Braunholtz, Secretary of the Institution of Gas Engineers, and Mr. F. M. Birks, President of the Institution.*

NORTH BRITISH SPRING MEETING DRAWS LARGE ATTENDANCE

THE Spring Meeting of the North British Association of Gas Managers was held at Dunblane Hotel Hydro, on April 27, the President, Mr. Fred. R. Mitchell (Lanarkshire Group), welcoming a large company.

The **President** said they were entering the third year of the industry under single ownership and perhaps they should recognise in that factor that they were more than ever dependent on one another. The formation of policy under single ownership presented a regular pattern, offering them as technicians and administrators new opportunities and greater possibilities of individual application in their respective areas. Each district had its own local problems and in most cases the solution would be more readily obtained, and to better advantage, locally.

The gas industry was becoming an important conservator of the country's coal supplies and was essential to the welfare and economic development of the domestic and industrial life of the country. It was to be hoped that certain existing handicaps to further developments of the industry would be quickly removed.

Their spring meeting might be the last held under the name of the North British Association of Gas Managers, but it was to be hoped that those traditions which they had come to value highly would remain undisturbed.

Sir Andrew Clow (Chairman of the Scottish Gas Board) said it was a pleasure and honour to welcome all present. He would give a special welcome to Mr. Mitchell, a valued administrator and a friend to all of them. Such gatherings were most valuable, not merely because of what could be discussed at the meeting, but because of what could be talked over privately. Living in one place, whether a city or a village, one could develop an isolated mind, and it was therefore useful to attend such a gathering and exchange ideas. He appreciated the manner in which they had brought their undertakings through a most difficult winter. These difficulties had been caused by climate and coal, and other items had presented their problems. The difficulties might not disappear in the future, but the manner in which they had overcome their past problems gave them hope and encouragement that they would surmount future obstacles.

The **President** said that since their last meeting they had lost by death Mr. J. W. McLusky, who became a member in 1915 and an hon. member in 1947; Mr. J. K. Frazer, made a member in 1919 and a life member in 1938; Mr. John B. Ferns, a member since 1933; and the following extraordinary members: Messrs. Harry A. Sykes (elected 1948); Charles J. Gregg (elected 1920); and James P. Whimster (elected 1913)

The Chairman of the Scottish Gas Board, Sir Andrew Clow, addressing members of the North British Association of Gas Managers during the meeting at Dunblane. Also included in the picture are the President, Mr. F. R. Mitchell, Mr. F. M. Birks, Mr. R. Sturrock, and Mr. R. Cowie, Junior Vice-President.

The President, introducing Mr. F. M. Birks, said he had reached the chair of the Institution through his unceasing efforts for the advancement of the industry. He had won renown in many branches of gas engineering.

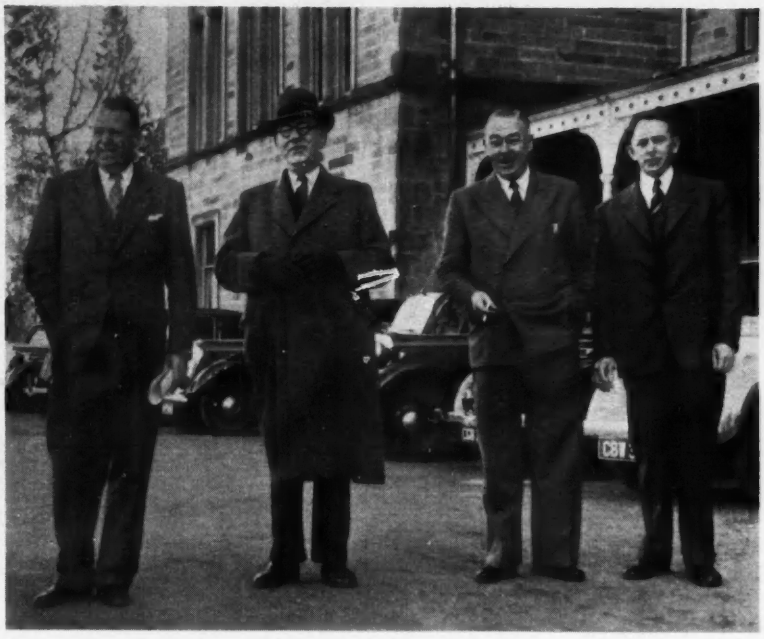
Mr. F. M. Birks, C.B.E., thanked the members for their invitation to be present. He had heard that the two Associations, so long established in Scotland, were to amalgamate and form a new body under the name of the 'Scottish Association of Gas Managers.' Throughout the whole of the industrial era Scotland had produced engineers who had done much for the industry in the world at large. Murdoch had been the first to produce commercial gas plant in conjunction with another famous Scot, James Watt. The Royal Society had presented Murdoch with a gold medal. In those spacious days the medal was of stupendous proportions, so much so that half of it provided sufficient gold for a massive and handsome snuff-box now on the table in the Institution Council room. The industry had grown, but their medals had become smaller and the amount of gold in them much less. He wished every happiness and prosperity to the new Scottish Association whenever it came into being and hoped that the child would be as successful as its illustrious parents. Concluding, Mr. Birks appealed to all members of the Institution present to remember the diminishing value of money and therefore to give generously to the Benevolent Fund of the Institution.

Introducing Mr. R. N. Quirk, Under-Secretary, Gas Division of the Ministry of Fuel and Power, the President said they should not forget the amount of planning undertaken in recent years by the Ministry, work on which much of their present development was based. Mr. Quirk had been closely associated with that work and with the preparation of the Gas Act, under which their industry now functioned.

Mr. Quirk said that one of the things a civil servant had to do was to meet the people with whom one dealt, and he had therefore been glad to accept an invitation to attend their meeting. He regretted that Mr. Noel-Baker himself had been unable to be present, but at the moment his other commitments made it impossible for him to leave London. The introduction of the Gas Act had changed to some extent the character of the work of the Ministry of Fuel and Power in its relationship to the gas industry. Before the war Private Acts and Orders had to be promoted for the development and extension of the area of an undertaking, but that was now eliminated, though there were still problems associated with the Town and Country Planning Acts. Gas testing and similar matters were now the responsibility of central government and not of local authorities. He was sure that in these matters co-operation would be forthcoming from the industry. Another matter with which his Division was concerned was that of shortages of materials. They were anxious that, as far as coal, gas, oil, sulphuric acid, and similar items were concerned the gas industry should receive a sufficient share of what was available to ensure that it was kept going. Thanks to the foresight of the industry itself, and perhaps to the assistance it had received from the Ministry, the industry had come successfully through the past critical winter. Gas itself in some places was in short supply and the Ministry had sometimes to act as an intermediary between the industry and those who wanted larger supplies. The same applied to tar, naphthalene, and coke. At present there was relatively little criticism of the gas industry, and perhaps that indicated that the boards were performing their functions satisfactorily. He himself was glad to be associated with an industry rendering such public service. He could assure them that his task, and that of his colleagues, was to interpret Government policy to the industry and also to ensure that it received its fair share of materials.

The President then gave his address, which will be published in a later issue.

Proposing a vote of thanks to the President, **Mr. E. G. Smith** (Glasgow), Senior Vice-President, said that in the gas industry, judged more often on its omissions and defects than on its achievements, repercussions from bad service were not confined to the area in which they occurred, but spread much further afield. In Lanarkshire, rapidly increasing demands for town gas could, but for the diligence and foresight of Mr. Mitchell, easily have resulted in a very different state of circumstances to those which were found today. Mr. Mitchell had made a notable contribution to the development of the industry, a contribution which was much appreciated in Lanarkshire and which would reflect to the credit of the industry as a whole. In 1920-21 the acquisition by the Lanarkshire County Council of various undertakings offered an opportunity of development over a large area and on a large scale. The restrictions of statutory boundaries at that time prevented the development being carried out to the best advantage from a production and distribution point of view, and this was more marked in industrial areas than in rural areas. These restrictive barriers, now removed by nationalisation, no longer impeded progress and divisions, groups, and sub-groups as they knew them today were suited to present-day conditions, and the recent changes illustrated the advantages of the system with flexible structure which permitted administration to be adjusted to run parallel with development. In these days of high capital costs it was indeed



Arriving at Dunblane Hotel Hydro for the meeting are, left to right: Mr. C. Pearson (Parkinson & Cowan, Ltd.), Mr. D. F. Young (Divisional Controller, Glasgow and West), Mr. G. Hannah (New Cumnock), and Mr. H. Tanner (Auchterarder).

Enjoying a seat in the spring sunshine after the meeting, Mr. W. S. Mackay (Oban) and Mr. H. McPherson (Newmilns).

fortunate that the Lanarkshire schemes, as prepared in former years, had a capacity to allow them to be put, in part, to early use and to be retained as a whole in the larger scheme. It was inevitable that in a scheme of such magnitude there would be many alternatives, each to be considered carefully and the advantages and disadvantages weighed before being laid aside. The address showed a record of the results of such a period of planning.

Since the inception of the new town of East Kilbride, continued Mr. Smith, Mr. Mitchell had been closely associated with its development, and it was a fitting climax to his address that he was able to announce that gas would be employed for domestic as well as industrial use. The President, as all presidents had done, had referred to coal, but his remarks on coal quality were subject to qualification. Undoubtedly, some undertakings were still experiencing the effects of the lowering of coal quality, and this was most likely to be confined to undertakings drawing their supplies from a limited number of pits. In Glasgow, where supplies were drawn from all Scottish coalfields and where coals were subjected to continuous laboratory tests, there had been over the past 12 months an improvement in quality as measured over the whole tonnage received. While much was still to be done in the improvement of coal quality, it was indicative of the real endeavour of the National Coal Board to bring about this end, and they gratefully acknowledged the rising of the quality and trusted that it will continue.

Mr. Robert Cowie (Hawick), Junior Vice-President, seconding the vote, remarked that in recent years the dwindling coal resources of Lanarkshire had received much publicity and the feeling abroad was that industrially that part of the country was declining. Gas output figures were a true index of the industrial and domestic prosperity anywhere, and the figures quoted that day were remarkable.

Mr. F. R. Mitchell presided at the luncheon, at which the toast of 'The Gas Industry' was proposed by **Sir Patrick Dollan,** LL.D., D.L., J.P., Chairman of the Scottish Fuel Efficiency Committee.

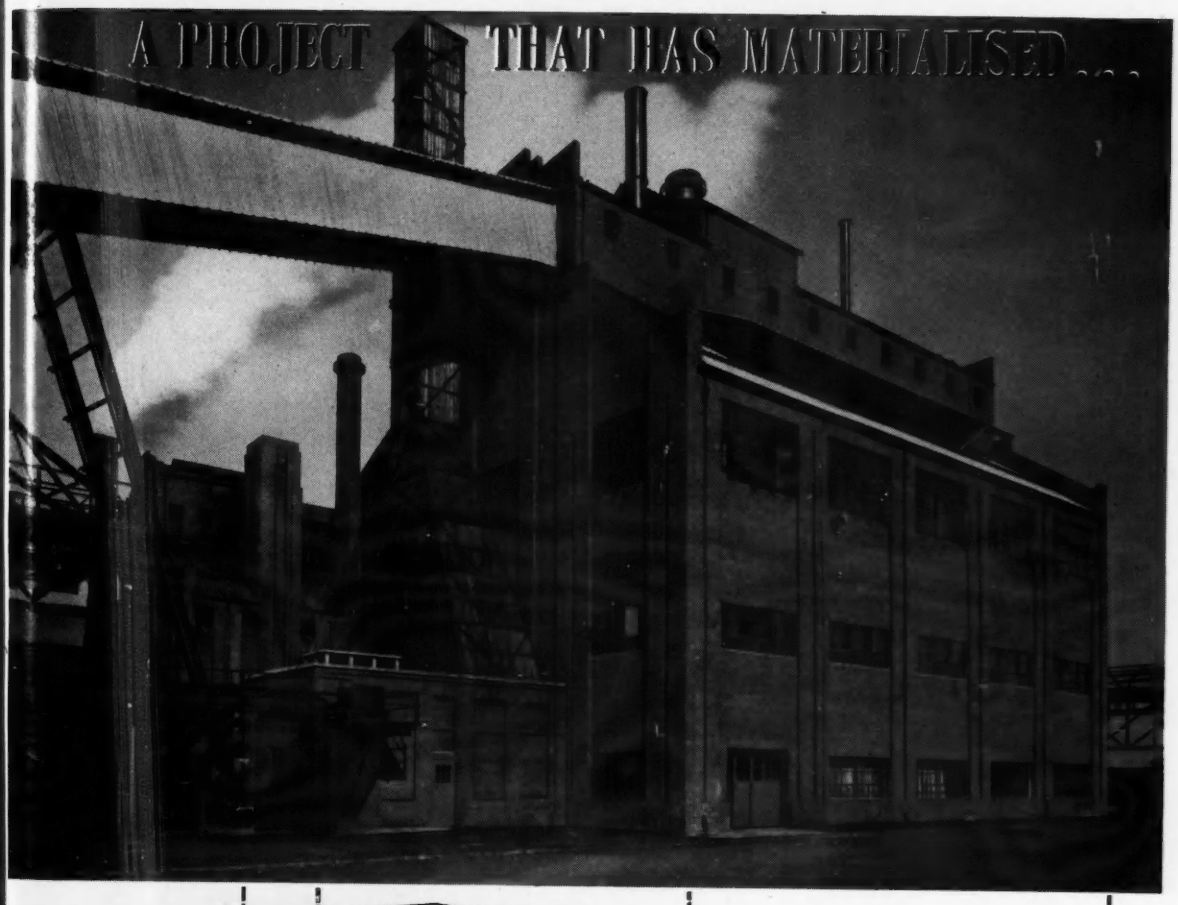
Mr. D. F. Young, Divisional Controller (Glasgow and West Division) Scottish Gas Board, with Mr. A. W. Brown, Secretary of the Association.

Sir Patrick said that people entered the gas industry not to make fortunes but because they liked it. His own experience led him to state that the gas industry was the most efficient in the whole country. Its members, however, were not content, but were engaged on research, making new discoveries. If they could get the same standard of efficiency and technical skill and the same good feeling between management and workers in other industries it would be a good thing for everybody, and there would be fewer shortages. One of the great shortages was coal, and it was a great achievement on their part to have maintained their production and distribution of gas as they had done since 1941. There had been no serious stoppage in the industry in Scotland. If they could maintain the present increase in coal output in Scotland, based on figures for the first three months of the year, it would mean an extra 12 mill. tons. His Committee had been working on a 10 year policy, approved by Mr. Noel-Baker, which he was now announcing for the first time. It would be at least 10 or 20 years before they would see the end of the fuel shortage. There should be a national fuel policy in the country and everything should be co-ordinated. He had thought that that would have come about under nationalisation. It was one of the things which some of them had striven for when they had supported nationalisation because they thought that that co-ordination would be the result. If the Ministry of Fuel and Power was to become the organisation it ought to be it should be responsible for the direction of a national policy affecting gas, electricity, coal, oil, and peat. The last-named would prove a great source of fuel supply in the next 10 or 20 years. Experiments had been conducted regarding the use of peat for the generation of electricity and large scale production of the necessary plant would be commenced in a Scottish factory. He would like to see one fuel body for Scotland. Instead of a hand-to-mouth policy, saving coal here and there, they now spoke in terms of efficiency and had a plan whereby they would survey every industrial plant in the country and every firm could get the advice of skilled technicians. Mobile units would be on the road and, as they knew, stokers could be trained to better efficiency and given certicates to that effect, enabling them, he hoped, to earn better wages. The public had to be educated into making more efficient use of electricity and electricity had to be more co-operative in the future with gas than it had been.

Mr. F. R. Mitchell, the President, presents a prize to Mr. J. Young (Dørvel) after the Bowling Competition at Dunblane. The President of the Bowling Club, Mr. Lewis Bain (Cullen) is on the right.

The Industry in 1851

Mr. F. M. Birks, replying to the toast, said it had been his pleasant duty for some time to delve into the past history of the industry, as he was preparing a paper to show its progress from the time of the Crystal Palace Exhibition to that of the 1951 Festival of Britain. The technical Press 100 years ago gave a picture very different from that of to-day. Half of it was filled with Parliamentary debates and the rest with an enormous number of Stock Exchange quotations, new undertakings in Britain, the Colonies and all over the world. At that time the industry had been in existence only 39 years. There was also a very good cooker produced at that time and some of the latest improvements seemed to have been incorporated in that 1851 cooker! Possibly because the price of gas was relatively high compared with coal the cooker did not have a long run and was forgotten for many years. It cropped up again in the early part of the century when the effect of the electricity industry was beginning to be felt seriously. As an industry they had changed over almost completely to



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The New and Fourth Installation of Intermittent Vertical Chambers at the Weston-Super-Mare Station of the South Western Gas Board. The third installation is in the background.

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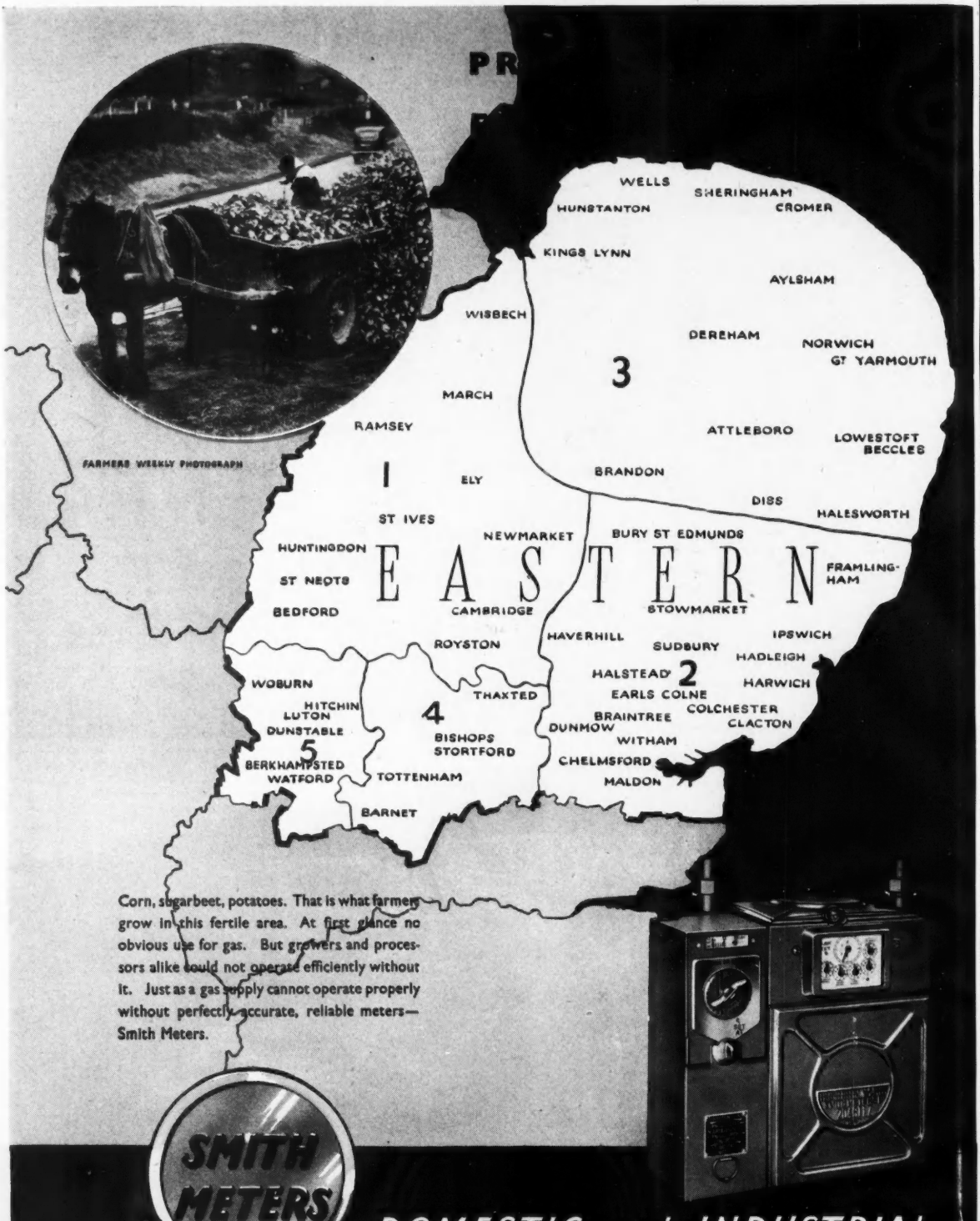

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cooking and heating in that short period, not losing any business but increasing throughout the years.

Mr. D. D. Burns (Scottish Gas Board) proposed 'The Guests,' and **Mr. Quirk** briefly replied.

Golf Circle

The Spring Competition for the Winson Scott Cup was played over the course of the Dunblane New Golf Club, on April 28, when a large number of members and visitors spent a very enjoyable day golfing in delightful weather. The Cup was won by the Secretary of the Golf Circle, Mr. W. P. Rae. The results were as follows:

Winner of Winson Scott Cup — W. P. Rae	87	less	12	= 75

Section I.

W. P. Rae	87	less	12	= 75
T. F. Scott, R. L. Laing	89	less	10	= 79
	86	less	7	= 79
W. C. Campbell, H. A. Aitken	88	less	8	= 80
	89	less	9	= 80

Section II.

T. A. Ross	95	less	14	= 81
A. W. Brown, D. Fulton, C. H. Pearson	103	less	18	= 85
	99	less	14	= 85
	103	less	18	= 85
J. McPherson	104	less	18	= 86

Visitors Sweepstake.

1. J. Donnachie	92	less	14	= 78
2. G. B. Torrance	97	less	18	= 79
3. T. R. Robertson	88	less	7	= 81

At the presentation of prizes in the Dunblane Hydro Hotel after the competition, the Captain of the Golf Circle,

Waiting to play off at the first tee at the Dunblane Golf Course, Mr. T. A. Ross (Fraserburgh) and Mr. H. H. Webster (R. & A. Main, Ltd.).

Mr. R. Sturrock, extended a welcome to members and visitors.

Mr. G. B. Torrance (*Gas Journal*) returned thanks on behalf of the visitors.

The winner of the Winson Scott Cup, Mr. W. P. Rae (Secretary of the N.B. Golf Circle) photographed with members of the Golf Circle after the presentation of prizes in the Dunblane Hotel Hydro.

The Captain of the Circle expressed thanks on behalf of the members to the Dunblane New Golf Club.

Mr. Stanley Bennet moved a vote of thanks to the Captain of the Circle, Mr. R. Sturrock, for his conduct of the chair during the meeting, and for the excellent work he had done for the circle during the year. It was intimated during the meeting that the Golf Circle September outing would be over the Western Gailles Course, Ayrshire.

Bowling Club

The North British Bowling Club were fortunate in being given the courtesy of the Dunblane Bowling Club's green for their spring competition on April 28. when five rinks took part.

The President of the North British Association of Gas Managers, Mr. F. R. Mitchell, presented prizes to the winners, who were as follows:

J. Taylor (Saltcoats), C. Balfour (Edinburgh), J. M. Ireland (Carnoustie). J. Young (Darvel) Skip, 20 shots up.

W. J. Mackay (Oban). R. Brackenridge (Glasgow), A. Stewart (Dunblane), A. Fraser (Dunblane) Skip, 16 shots up.

Mr. Lewis Bain, President of the Bowling Club, expressed thanks to Mr. Mitchell for presenting the prizes, and also to the Dunblane Bowling Club for the use of the green. Mr. Bain announced that the N.B. Bowling Club would be celebrating its 25th anniversary in September, and after the autumn competition it was intended to hold a dinner at which, he hoped, a large number of members would be present.

Scottish Western Juniors

THE annual general meeting of the Scottish Junior Gas Association (Western District) was held in Glasgow on April 20, under the presidency of Mr. A. McInnes (Dumbarton). The attendance at the meeting was exceptionally weak, there being no more than a total of 20 members present.

Mr. McInnes in opening the meeting, remarked on the steady decline in attendances at both meetings and visits, and added that, to try to improve matters, the Council had sent a questionnaire to all members on which they were requested to state the most suitable day and time for them to attend meetings.

Mr. McInnes then announced that intimation had that day been received from the Society of British Gas Industries that Mr. Colin Campbell (Dawsholm Gasworks), had been awarded a Silver medal for his paper entitled 'Concerning Safety.'

The Council's annual report and financial statement were both agreed upon, and the election of officers for the session 1951-52, resulted as follows:—

President. J. Wilson (Stirling).

Vice President. R. A. Currie (Glasgow).

Hon. Secretary and Treasurer. W. A. Green (Paisley).

Hon. Transactions Secretary. R. A. Currie (Glasgow).

Auditors. Frank Hailstones (Glasgow) and John Greig (Dawsholm).

Members of Council. A. Walker (Motherwell), G. Laing (Barrhead), G. Royden (Tradeston), A. Blackie (Paisley), and M. Rowatt (Glasgow), all of whom retire in 1953; H. Whitehead (Cambuslang), E. Black (Motherwell), C. Campbell (Dawsholm), and W. Dalrymple (Glasgow), who retire in 1952. Mr. A. McInnes will be an ex-officio member of Council until 1952.

At the conclusion of the ordinary business Mr. James Hall (Provan), gave an informal address on educational activities throughout the past year.

Mr. J. Wilson (Stirling) proposed a vote of thanks, to which Mr. Hall replied.

Wales Gas Engineers at Llandudno

Praise for Nationalised Structure

THE Spring Meeting of the Wales and Monmouthshire Section of the Institution of Gas Engineers was held at the Grand Hotel, Llandudno, on May 4, under the Chairmanship of Mr. J. Powdrill (Pontypool). The formal business was preceded by a hearty welcome by **Councillor J. B. Jones,** Chairman of the Llandudno Urban District Council.

The accounts for the period from April 1 to June 30, 1950, already adopted subject to audit, were reported to have been duly audited and were approved on the proposition of **Mr. C. L. Singleton** (Chepstow), seconded by **Mr. S. L. Wright** (Wales Gas Board).

On the proposition of **Mr. W. F. Edwards** (Port Talbot), seconded by **Mr. W. Clark Jackson** (Pembrokeshire Group), the following new members were elected and welcomed: H. Allerton (Llandudna), J. Lomax (Rhyl), R. J. Ashwood (Mechanical Engineer, Wales Gas Board), R. Miller (Bath), and S. S. Francis (Woodall-Duckham Company, London).

The **Chairman** presented prizes, provided by the Wales Gas Board, to Wales students who had been successful in the past year's examinations. In doing so Mr. Powdrill thanked the members of the Board for their generosity in providing the prizes to encourage the students. It was an old tradition to recognise the success of students, but the Board had greatly extended that recognition and he congratulated the recipients.

Mr. Powdrill then delivered his Presidential Address, with which we shall deal in a later issue.

Three Musketeers

Mr. O. P. Cronshaw (Rhyl) proposed a vote of thanks for the address and said he agreed with Mr. Powdrill when he said he felt the area boards were big enough to appreciate that the men they placed in positions of trust must, of necessity, be individualists and men of strong character, and that, with that understanding, any difference should not be too difficult to be mutually and satisfactorily resolved. Those remarks expressed the character of their Chairman, an individualist of strong character, whom he thanked for his promise of a paper at a later date on the more detailed operation of the new Pontypool works. With only two exceptions he (Mr. Cronshaw) had known Mr. Powdrill longer than anyone else present, the exceptions being Mr. A. J. Harrison and Mr. H. Blythe. Mr. Blythe, Mr. Powdrill, and himself were juniors together at the Accrington works many years ago under Mr. Harrison. They all came to Wales by different ways, and had all been chairman within the space of a very few years.

Mr. Darrell W. Rees (Pembroke Dock), in seconding, said that in carrying out his duties so admirably during his year of office Mr. Powdrill had been heartily supported by Mrs. Powdrill, who was equally deserving of their thanks.

Mr. Powdrill briefly acknowledged the vote of thanks.

The rest of the morning session was devoted to an informal discourse by Mr. C. A. Masterman, of the Ministry of Fuel and Power, 'On Underground Gasification of Coal'—a summary of the paper he had previously presented to the Institute of Fuel, to which we have already referred in the *Journal*.

Benevolent Fund Appeal

At the opening of the afternoon session **Mr. F. M. Birks,** President of the Institution of Gas Engineers, made an earnest appeal on behalf of the Benevolent Fund. He referred to the increasing hardships of many people with small fixed incomes and the fact that such help as the Benevolent Fund was able to give them was of less value than in the past owing to the lessened value of money. He appealed to existing subscribers to increase their payments and to those not yet subscribing to do so as soon as possible.

Three papers were then presented and discussed: 'The Space Heating Load,' by K. M. Ernest (Cardiff); 'Some Reflections on the Use of Butane,' by A. D. Howells (Abergavenny); and 'Improvements in Gas-making Conditions on a Small Works,' by H. J. Stanley (Penmaenmawr). We hope to make reference to these in future issues.

A comprehensive vote of thanks to all three authors was accorded on the proposition of **Mr. H. Blythe** (Colwyn Bay), seconded by **Mr. J. F. Rust** (Newport).

There was a record attendance of 230 at the official luncheon, at which **Mr. F. M. Birks,** C.B.E., President of the Institution of Gas Engineers, proposed the toast of the Wales and Monmouthshire Section. Had he been a gas engineer when he first came to Wales, he said, he might have been one of the oldest members of the former Association, because he first came in 1908, and during the 12 years he spent in Wales he learnt to appreciate the country and its people, and made many friends. After so long a sojourn his hearers might wonder why he did not address them in their mother tongue, but he had failed to find the Welsh equivalents for 'peak loads' and 'specific gravity.' Among the names he recalled in those early days were those of Madden and Clarry, both trained at Becktón. When he returned to Beckton he found that the Chairman of the old Swansea Company, Roger Beck, was of the same Quaker family as the celebrated Governer of the Gas Light and Coke Company, Adams Beck, after whom the Beckton works was named. He congratulated the Section on having a national name rather than that of a point of the compass, and wished its members every success.

The **Chairman,** in a brief response, thanked the members of the Management Committee, and particularly Mr. K. E. Tiddy, the Hon. Secretary, for their loyal support during his year of office. A very large part of the success of the present meeting was due to the energy of Mr. Blythe and Mr. Cronshaw. He was especially glad to welcome his old chief, Mr. A. J. Harrison, and he expressed his gratitude to the Chairman and members of the Wales Gas Board and to all the members of the Section for the support they had given to him.

Mr. T. Mervyn Jones, M.A., Chairman of the Wales Gas Board, proposed the toast of 'The Town and Urban District Council of Llandudno.' He referred to the town's many attractions and said the Section was to be complimented upon choosing so glamorous a resort for its Festival Year meeting.

Councillor J. B. Jones, J.P., Chairman of the Llandudno U.D.C., responding, recalled that the Llandudno Gas and Water Company was formed in 1857. In 1876 the local authority acquired the undertaking and from then until vesting day it was proud to carry it on. He was glad that under the Wales Gas Board their own local engineer and manager, Mr. H. Allerton, was left in charge. Electricity was switched on in 1898 and until nationalisation both were in the hands of the local council.

Mr. A. Pickard (Llanelly), Senior Vice-Chairman of the Section, proposed the toast of the guests, among whom he mentioned Mr. Birks, Sir Ernest Smith (Chairman of the Industrial Coal Consumers' Council), Mr. A. G. Higgins (Assistant Secretary of the Institution of Gas Engineers), Mr. J. R. W. Alexander (Executive Chairman of the Gas Officers' Guild), Major C. C. Hyde (Ministry of Fuel and Power), and Mr. A. J. Harrison (formerly of the Accrington undertaking). He also included Mr. Mervyn Jones and Mr. R. S. Snelling (Chairman and Deputy Chairman of the Wales Gas Board), both Hon. Members of the Section.

A Good Lead

Sir Ernest Smith, C.B.E., responding, said that as a visitor he congratulated the Wales Gas Board on the lead it had given to most of the area boards as to how to take over the gas industry. It seemed to him that some boards had felt it was their fundamental duty to do something fresh rather than to act as a lubricator and to adjust and maintain and extend as demand required. The quest for perfection was outstripping the capacity of the patient to take perfection in such large doses. In Wales they had men remaining in their old positions, understanding local requirements, and carrying on the service to which the consumers had been accustomed.

(*Continued on p.* 395.)

Manchester and District Section—I.G.E.

ANNUAL GENERAL MEETING

THE first Annual General Meeting of the Manchester and District Section of the Institution of Gas Engineers was held at the Engineers' Club, Manchester, on April 27, Mr. N. G. Appleyard being in the chair. The meeting was preceded by a luncheon.

The Committee recorded, with regret, the deaths of Mr. F. G. Brockway, Cleethorpes (member, 1925), and Mr. A. L. Holton, Altrincham (member, 1922). Former members who had passed away during the year included Mr. J. T. Broughton (Haslingden) and Mr. F. D. Richmond (Harrogate).

In the report of the Committee no reference was made to membership. The change in the constitution had meant that all members of the former Manchester District Association of Gas Engineers had to apply for membership of the new Section. Many old friends and colleagues had taken the opportunity to terminate their membership. The greater majority of those who did so had joined their local district sections, which would undoubtedly be a greater convenience to them. The Management Committee were sorry that these ties were now being severed, and would like to assure all old friends that they would be delighted to welcome them at any future meetings.

On the proposition of **Mr. C. S. Shapley,** seconded by **Mr. F. G. Shaw,** the report of the Management Committee was adopted unanimously.

Mr. J. H. Clegg (Hon. Treasurer) then presented a statement of accounts for the eleven months ended December 31, 1950. There was a satisfactory balance at the bank. On the proposition of Mr. L. Pickles, seconded by Mr. H. D. Robinson, the statement was adopted.

The **Chairman,** as District Member of the Council of the Institution of Gas Engineers, said that in regard to the Benevolent Fund of the Institution he had been surprised to learn that out of 2,754 members only 1,356 contributed to the Fund. The Committee administering the Benevolent Fund was worthy of far more support. The number of subscribers should not be permitted to fall below 50% of the membership. He suggested they should all analyse their consciences, and consider whether they were doing what they ought to do in that respect.

Mr. R. L. Greaves then proposed, and **Mr. W. A. Dearden** seconded, that the following recommendations of the Management Committee be accepted, and they were accordingly adopted:—

That a donation of 35 guineas be contributed to the Benevolent Fund of the Institution; that Mr. T. Haworth be appointed the Manchester and District Section's District Member on the Council of the Institution for 1951-52; that Mr. John Grayston, G.M., and Mr. A. Cole be appointed representatives of the Manchester and District Section on the Councils of the Manchester and District and Yorkshire Junior Gas Associations, respectively; that Messrs. J. H. Clegg, J. Castle, W. B. Harrison, and H. H. Thomas be appointed representatives of the Manchester and District Section on the Lancashire District Gas Education Committee; that Messrs. N. G. Appleyard, H. Johnston, J. G. Tilley, and J. M. McLusky be appointed representatives of the Manchester and District Section on the Yorkshire District Gas Education Committee.

Chairman (1951 - 52), Thomas Haworth.

Senior Vice-Chairman (1951 - 52), Alexander McDonald.

Junior Vice-Chairman (1951-52), A. K. Collinge.

Auditors, J. H. Richmond and A. E. Yates.

Hon. Secretary, Alan H. Nicholson.

Hon. Treasurer, J. Herbert Clegg.

Members of Committee (1951-54), H. Robinson, John Wilson, James McLusky, C. A. Newham.

Mr. G. E. Currier, O.B.E., Deputy Chairman of the North Eastern Gas Board, speaking in regard to the support accorded to the Benevolent Fund of the Institution, thanked the Chairman and members of the District Section for the generous contribution they had made to it.

The retiring Chairman (Mr. N. G. Appleyard) said it was his pleasing duty to install Mr. Thomas Haworth as Chairman of the Manchester and District Section. No one was more qualified than Mr. Haworth to hold that office. He had served the 'Manchesters' faithfully and well during the period 1943-49, when he was the Hon. Secretary and Treasurer of the Manchester District Association of Gas Engineers.

Mr. Thomas Haworth was then formally invested with the badge of office, following which he invested Mr. Appleyard with what was really a Past President's badge, which had been bequeathed by the late Mr. A. L. Holton to the Manchester District Association of Gas Engineers.

Mr. D. P. Welman (Chairman of the North Western Gas Board) congratulated the newly-appointed Chairman on his installation and wished him a very successful year of office.

Thereafter Mr. Haworth gave his address as Chairman.

Mr. A. McDonald (member, North Eastern Gas Board) proposed a vote of thanks to Mr. Howorth, and **Mr. A. K. Collinge** seconded.

On the motion of Mr. H. D. Hainsworth, seconded by Mr. N. Jack, a vote of thanks was accorded to the retiring members of the Management Committee for their services during the past year.

Juniors Visit Wigan

A JOINT meeting of the Manchester District Junior Association of Gas Engineers and the Yorkshire Junior Gas Association took place at Wigan on April 18. Mr. D. M. Thompson, President, led the Manchester Association, while Mr. Sam Davies, President, led the members from Yorkshire.

The Mayor of Wigan, Councillor A. J. Lowe, J.P., in extending a cordial welcome to the members of the two organisations, said that in Wigan they felt very proud to be honoured with such a joint visit. Speaking as the 703rd Mayor of 'The Ancient and Loyal Borough of Wigan,' he was pleased to see present Mr. D. M. Thompson, the President of the Manchester members. Prior to nationalisation Mr. Thompson was the Distribution Superintendent of the Wigan gas undertaking, and while he was so employed he had proved himself to be a very capable and efficient officer.

They also welcomed the Chairman of the North Western Gas Board, Mr. D. P. Welman, Mr. A. Henshall, the Deputy Chairman of the Board, and Mr. H. Butters, member.

By invitation of the North Western Gas Board the members of the two Associations were entertained at luncheon.

The toast of the Chairman and members of the N.W. Gas Board was proposed by Mr. Sam Davies, who remarked that they were all pleased to welcome Mr. D. P. Welman, and they would like to thank the Mayor for his kindly reception.

Mr. D. P. Welman, responding to the toast, said that the Gas Act of 1948 gave great opportunities to the gas industry which compensated for the pangs felt through the loss of local control. He understood that there had been feelings in certain quarters that the boards were not whole-hearted in their granting of time for the holding of association meetings. He wanted to dispel that feeling completely. His Board fully appreciated how much could be done by associations in furthering the long-term opportunities of the industry by development of the technical quality, capacity, and character of the individual.

Mr. R. L. Greaves, O.B.E. General Manager, South Lancashire Group) proposed the toast of the County Borough of Wigan, to which the Mayor replied.

The members of the two Associations then paid a visit of inspection to the Wigan gasworks.

CONSULTATIVE COUNCILS IN SESSION

The Public Lighting Load

COMMENT was made in the *Journal* of April 11 on a matter which exercised the attention of the North Thames Gas Consultative Council—namely, the sale of gas for public lighting at an uneconomic figure which, it was observed, was tantamount to subsidising the load. A reply from the Gas Board was reported at the last meeting of the Council, held at the Westminster City Hall, on April 26, under the chairmanship of Councillor Edwin Bayliss, D.L., J.P.

The Gas Board stated that there were still in operation a number of pre-war public lighting contracts, many of which had been extended by the period of the war years in which no public lighting was possible. In many cases the charges included a larger discount than would be allowed today. The price of gas, however, in these contracts was subject to a rise-and-fall clause, which had operated; but none of them contained a provision for any increase in the cost of labour and materials.

Although in all but one case local authorities had agreed to contribute to the increased cost of maintenance, it was only on the basis of sharing and not of bearing the full amount of the increase. It was therefore necessary to debit the revenue received from gas with the loss on maintenance—thus producing the abnormally low figure shown in the accounts, to which the Consultative Council had drawn attention.

Concluding the Gas Board's statement on this matter, it was pointed out that for some years it had been the policy, when public lighting contracts expired, to negotiate new ones on the basis of present-day costs of labour and materials. The price of gas was also related to present-day costs, having regard to the nature of the load. The rise-and-fall clause covered both labour and materials and the price of gas.

It was at this meeting of the Council that the Chairman of the Board (Mr. Michael Milne-Watson) detailed, in private session, the circumstances which compelled the Board to increase the price of gas by 1½d. per therm as from July 2—as briefly announced in last week's *Journal*. The Council, while regretting the increase, accepted the Board's proposal.

There was further discussion of the Board's policy of converting penny-in-the-slot meters to take coins of a higher value—with particular reference to the possibility of hardship to consumers in the lower income groups. The Board had taken notice of such complaints as had arisen in this connection, though it was not clear whether these complaints related to the period prior to the assurance given by the Board. The Commercial Manager was investigating the matter personally. It might be of interest to the Council to know that there were still 400,000 penny-in-the-slot meters in use in the Board's area of supply.

The Board also agreed to investigate the complaint that at certain showrooms there were not adequate facilities for consumers to discuss their business in privacy.

The next meeting of the Council was fixed for Thursday, May 31, at 2.30 p.m., at the Westminster City Hall, W.C.2.

North Eastern Price Increase

AT Leeds on April 23 the North Eastern Gas Consultative Council approved a proposal to increase the price of gas, to take effect with the next meter-reading after the end of the month.

Dr. R. S. Edwards (Chairman of the Gas Board) announced that it was proposed to secure the sum required to cover increased costs by imposing a surcharge of 10% on the amount due for gas after allowing for quantity discounts, but including standing charges under two-part tariffs. For the average domestic consumer the extra charge would be 3d. per week. Of the net increase in costs of £1,081,000, the Board had been able to absorb £463,000 through the trading profit arising from increased gas sales, economies, and increased efficiency; but there remained a deficit of £618,000. Dr. Edwards saw no evidence that the rise in costs had reached its climax. Indeed, all the signs were to the contrary, and in consequence the Board thought it prudent to impose charges to bring a revenue of £700,000.

This increase, in the absence of further advance in costs or contraction of gas sales, should enable the Board to secure a modest surplus for the financial year ending on March 31 next. The surcharge would continue until the new tariff system became operative. The price levels of the new tariffs would be such as to produce the total revenue required by the Board, and opportunity would be taken at that time to make any adjustments in revenue which might be found necessary. Dr. Edwards further stated that it was felt wrong to wait until the new tariffs had been finally completed and continue meanwhile to meet rising costs without corresponding revenue coming in.

Southern Appointment

The Minister of Fuel and Power has appointed Councillor F. Smart, of Cowes, Isle of Wight, to be a member of the Southern Gas Consultative Council.

Showroom Extravagance Refuted

ALLEGATIONS of 'extravagant furnishings and floral decorations' in the Penzance showrooms of the South Western Gas Board, made by a Penzance town councillor, were refuted by members of the Consultative Council at Taunton on May 2, and a resolution was passed concurring in the policy of the Gas Board in brightening showrooms.

The Chairman, Mr. A. W. Loveys (Taunton), said the Council had received a letter from the Ministry of Fuel and Power, following representations made by the Penzance M.P. about the town councillor's allegations.

Mrs. E. J. Exelby (Redruth) reported on a visit of inspection to the Penzance showrooms. She said that many showrooms in South Cornwall were very sub-standard on vesting day. Those at Penzance were probably the best in the sub-division from the structural and design point of view, and they had been brought up-to-date for demonstration purposes. There had been many expressions of appreciation by people visiting the showrooms, and she saw nothing extravagant.

The Chairman said the question was whether money had been wasted on this method of presentation and adaptation of the premises to attract the public from the sales point of view. He considered there had been no extravagance at all. Some businesses spent more than £100 on dressing a window which did not last very long.

Miss Jessie Stephen (Bristol) said that from her experience of business she would say they had put on a very in-extravagant show for the sales they were having. There was no question that women were attracted to a pretty window, and as they were mainly the people the Gas Board had to cater for she thought this complaint was very foolish indeed.

Mr. L. P. Ingram (Southern Divisional Deputy General Manager) said the old Penzance showroom had no facilities for cookery demonstrations or meetings, no furnishings and no curtains. Consumers only went there when they had to, and sales were very bad. To-day they would be amazed at the change—and those responsible were to be congratulated on coming into line with modern display practice. 'We are in competition not only with electricity and coal,' said Mr. Ingram, 'but with milliners and everybody else. If a woman buys a new hat, she does not buy a cooker. It is the right policy to make our showrooms as attractive as possible.'

The Use of

STORED LIQUID METHANE

to Meet Peak Loads

By G. G. HASELDEN, Ph.D., D.I.C., A.M.I.Chem.E.,
and
M. W. REIS, B.Sc., A.C.G.I.

The reasons that have led to a study of liquid methane storage as a method of combating peak gas demands are outlined in this Paper. An example is considered where liquid methane storage is applied to a gas works with a mean daily output of 200,000 therms. Three schemes are considered. The first provides for methane liquefaction and storage only, the second combines ethylene recovery, and the third makes provision for adapting the methane separation plant for the production of oxygen during the winter months. The low-temperature plant for each scheme is described. An approximate cost estimate is given for stored liquid methane, and a comparison is made with existing methods for meeting peak gas demands. The paper was given at a joint meeting of the Institution of Gas Engineers and the Physical Society on April 11.

THE small degree of flexibility inherent in present methods of town gas production by the carbonisation of coal makes it necessary to employ alternative methods of gas production at periods of peak seasonal demand if these loads are to be met economically. The requirements of these alternative processes are that they shall be able to generate rapidly, and provide at short notice, large volumes of gas from readily stored materials. Moreover, the capital cost of the plant and labour requirements must be low.

Various methods already exist for fulfilling these demands, of which the most important in this country is the generation of carburetted water gas. Other systems, using cracked gas produced from heavy petroleum fractions or propane-air mixtures, are practised in the United States of America and France. Since, however, these methods depend on petroleum as the basic fuel they operate at a disadvantage in non-oil producing countries such as Great Britain.

An interesting problem is therefore presented in which it is required to find either cheaper and more rapid methods of producing from coal or coke a gas of high calorific value or, alternatively, a coal derivative that could readily be stored and rapidly transformed into a gaseous fuel. Attempts to achieve the first objective by the total gasification of coal with oxygen do not as yet appear to furnish the flexibility required for this type of load, although the storage of oxygen as liquid might go part way towards the solution of this difficulty. The second alternative, employing the storage of a derived fuel, appears to furnish a more immediate solution to the problem. In particular, if a proportion of the methane from coal gas could be separated during periods of low load in the summer months, and economically stored, it could then be used in admixture with producer gas or blue water gas for meeting peak winter demands. Since producer gas or water gas units possess considerable flexibility and are economical to operate, this combination with stored methane would appear to afford a possible solution to peak-load problems. In addition to giving freedom from fuels derived from petroleum, this system has further interesting features. Thus the use of stored methane affords a method of controlling the load factor on the base-load carbonisation plant by increasing the demand upon it during the summer months and supplementing its output during the winter months. By using the appropriate level of methane storage it would therefore be possible to run the base-load plant at its most economical load factor, due attention being paid to the necessity for letting down a part of the plant for maintenance, and for releasing labour for holidays during the summer months. Further advantages will be discussed in the course of the paper.

A variety of methods exists for the storage of methane in bulk, and the relative merits of each have been carefully studied[1-4]. From these analyses it is apparent that the storage of methane as liquid at atmospheric pressure and—161.5°C. in large insulated tanks affords great economies over all other methods, except in special localities where spent natural gas wells are at hand. Therefore, for the project being studied, only storage of methane as liquid will be considered.

The separation and storage of liquid methane for the British gas industry was first suggested by Egerton in 1937, and has already been briefly discussed in three papers from the Chemical Engineering Department of the Imperial College of Science and Technology,[2-3-4]. The purpose of this further paper is to attempt to carry the basic ideas to the stage of more definite proposals and to attempt where possible an approximate estimate of costs.

The closest parallel to the plant under consideration was that erected in Cleveland in 1941[5-6-7] for the liquefaction and storage of natural gas against peak seasonal demands. The raw gas contained approximately 96% methane and could be liquified without further separation, apart from the removal of a small amount of carbon dioxide. This plant, which provided storage for almost 3 mill. gal. of liquid methane, fulfilled all its operational requirements until the failure of one of the storage tanks, in the absence of proper safety provisions, led to a tragic disaster involving great loss of life and property. This occurrence demonstrated most forcibly that no further installation involving the large-scale storage of liquid methane in built-up areas should be contemplated unless the hazards involved can be completely eliminated. It is the opinion of the authors, for reasons to be given, that this can be done.

A liquid methane installation at a gasworks will comprise three distinct elements for performing respectively the separation (including liquefaction), storage, and re-evaporation of the methane. The separation of a given quantity of methane from coal gas during periods of low load may be carried out in plants of two types, the first in which the whole of the gas-make is treated but only a small proportion of the methane is separated, and the second in which only a fraction of the gas-make is treated but the greatest possible recovery of methane is achieved. In certain cases—for instance, where the recovery of very large quantities of by-product ethylene is desired—the first type of unit would be chosen, but in general the second type of unit, which requires much smaller plant, will be preferred. The plants to be described will be of the second type.

The re-evaporation of the liquid methane for use cannot readily be coupled with any system for recovering its

refrigerating effect; however, the given conditions are more favourable than those obtaining in Cleveland. There it was necessary to erect special heat exchange devices consuming considerable quantities of steam for effecting the evaporation. In the present application it would appear possible to flash-vaporise the liquid methane by spraying it into the warm dilution gas (producer gas or blue water gas at 300° to 400°F.).

The capacity of the liquid methane installation for any particular works will be related to the size of the works, the extent of seasonal load variation, and the degree to which peak-load contingencies are to be provided for. The following plant is taken as an example*:—

Declared calorific value of distributed gas	500 B.Th.U./cu.ft.
Mean daily output	200,000 therms
Maximum winter day demand	360,000 therms
Minimum summer day demand	120,000 therms

This maximum demand would only occur during a very severe winter (usually only a few days in 10 years).

The variations in demand with which the plant will be required to deal are rather less than these, due to the fact that the amount of gasholder capacity normally installed at a works (about 17 or 18 hr. gas supply) is sufficient to smooth out the day-to-day variations to an extent that permits plant demands to be considered on a seven-day basis. Daily plant loads can therefore be considered on the basis of one-seventh of the seven-day period. The mean winter demand now becomes 250,000 therms, with a 1 : 100 probability of the demand rising to 282,000 therms, and a 1 : 1,000 chance that the daily demand will reach 306,000 therms. The minimum normal demand at the beginning of August would be 140,000 therms, though there is a 1 : 50 probability of this falling to 135,000 therms.

If the most unfavourable case be taken, where 1 : 1,000 contingencies are guarded against, the following plant is required:—

Carbonising plant (generating gas at 560 B.Th.U./cu.ft.),—210,000 therms per day.

Blue water gas plant (295 B.Th.U./cu.ft.),—46,000 therms per day.

Low-temperature plant to handle 100,000 cu.ft. of coal gas/hr.

Liquid methane storage, 1 mill. gal.

Load Factor

The load factor on the carbonisation plant is 89.5% which would require that 70% of the plant would be working throughout the year, 10% for 84% of the year, 10% for 63% of the year, and the remaining 10% for 48% of the year. This load factor would justify the use of the most efficient type of carbonising plant, with provision for maximum heat recovery.

Further flexibility of operation is obtained by generating producer gas (calorific value, 125 B.Th.U./cu.ft.) in place of blue water gas in the same plant. At times of exceptional winter demand (1 : 1,000 contingencies), it is proposed to increase the calorific value of the distributed gas to 518 B.Th.U./cu.ft. by over-enrichment with methane. This would eliminate the need for further water gas plant, which would otherwise be used for only a few days in 10 years. It has the other more important advantage that at times of exceptionally high demand where the capacity of the distribution system might become inadequate, the situation could be counterbalanced by the increased calorific value of the gas.

During the whole range of operation of the plant, from the summer minimum to the winter peak demand, the specific gravity and Wobbe Number (defining the combustion characteristics) of the distributed gas could be very closely maintained.

The various plant schemes that could be used for separating and liquefying methane from coal gas on the scale of 100,000 cu.ft./hr. will now be considered.

The separation of methane from coal gas requires plant that may with only slight modification be used for other beneficial purposes. Three different installations will therefore be considered, as follows:—

(1) Liquid methane production and storage only.

(2) Liquid methane production and storage, coupled with ethylene separation.

(3) Liquid methane production and storage, coupled with oxygen production during peak winter months.

In the first type of installation, storage of liquid methane is considered on its own merits. The separation and liquefaction plant will normally be used only during the summer and autumn seasons, but if desired the plant could be kept cool by evaporating in it some of the liquid methane going from storage into the gas supply, in which case the plant could be rapidly started up and used to replenish the liquid methane stock during any warm winter spells. In either case the charges for labour and supervision of the low-temperature plant must be budgeted over the full year.

Ethylene separation could be carried out in two ways, either to produce an ethylene fraction containing 30 to 40% of C_2H_4, or by the inclusion of two small columns to give 98 to 99% of C_2H_4. In both cases it would be necessary to construct the ancillary plant for the hydration of ethylene product to ethanol or its conversion to ethylene oxide, etc. For this reason it would be desirable to continue production of ethylene all the year round except, perhaps, at periods of exceptionally high gas demand.

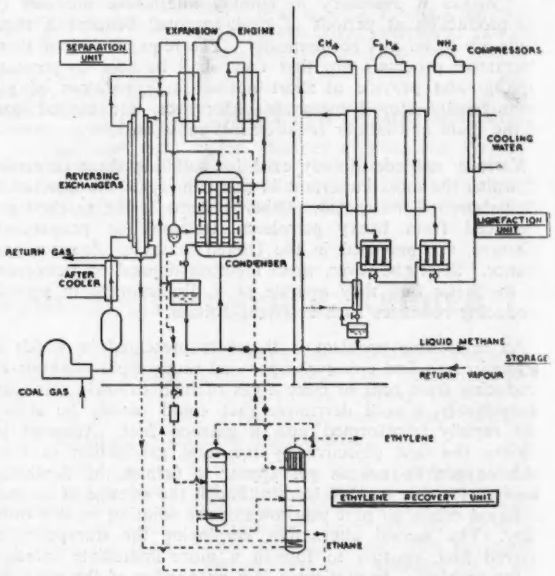


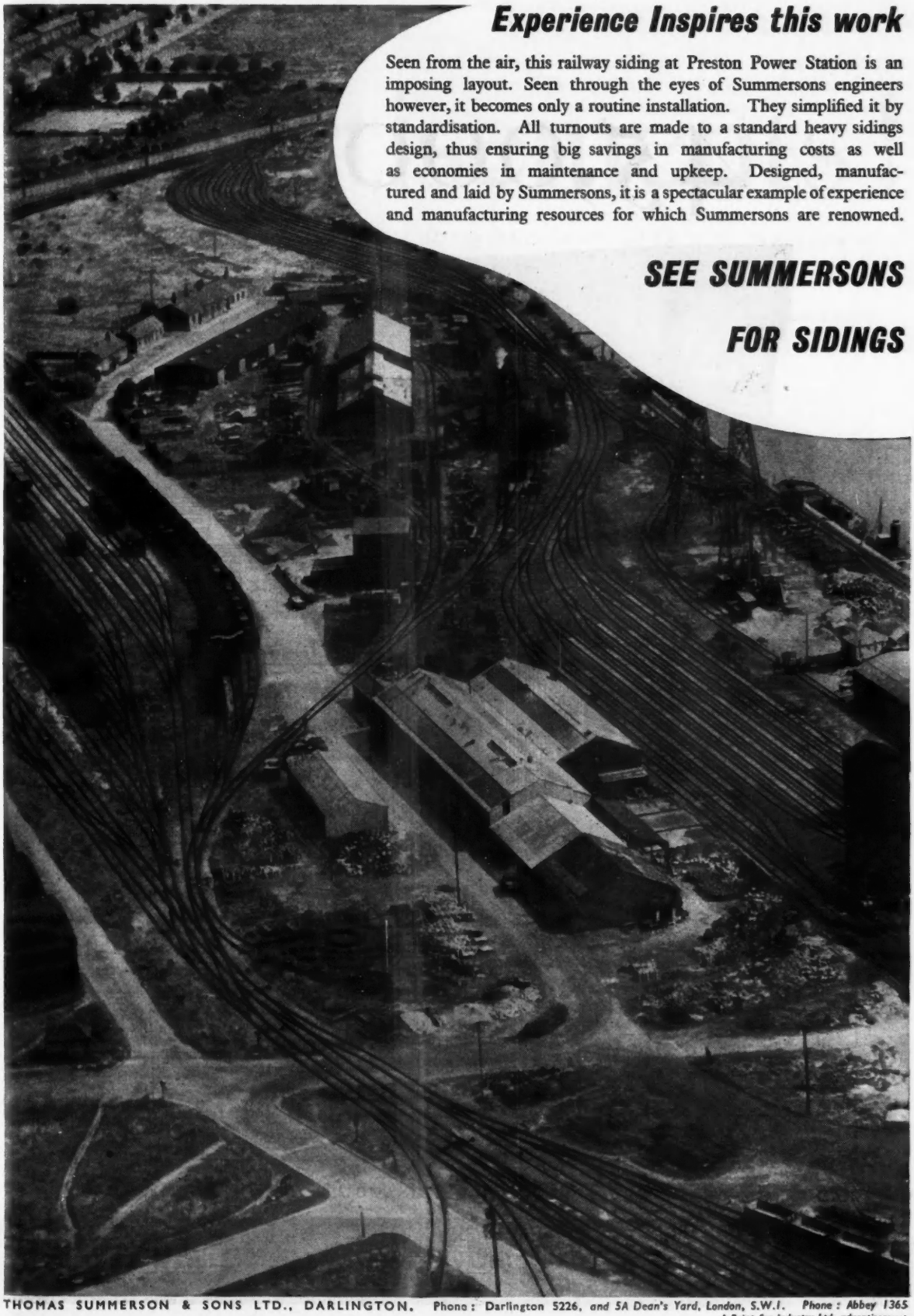
Fig. 1.—Suggested layout for a methane separation and liquefaction plant.

The third type of installation is possible because the plant chosen for methane separation from coal gas can be used with only minor modification for the separation of oxygen from air. Stringent precautions would, of course, be necessary to eliminate explosion risks at the change-over. It would then be possible to make available useful quantities of oxygen at times of peak demand, when, for instance, it could be used for greatly increasing the output, and to a lesser extent the efficiency, of the water gas units.

Separation and Liquefaction of Methane

The requirements of the plant, are as follows:—

(1) To separate approximately 90% of the methane content of the coal gas together with some of the higher boiling hydrocarbons, but with the minimum amount of nitrogen.



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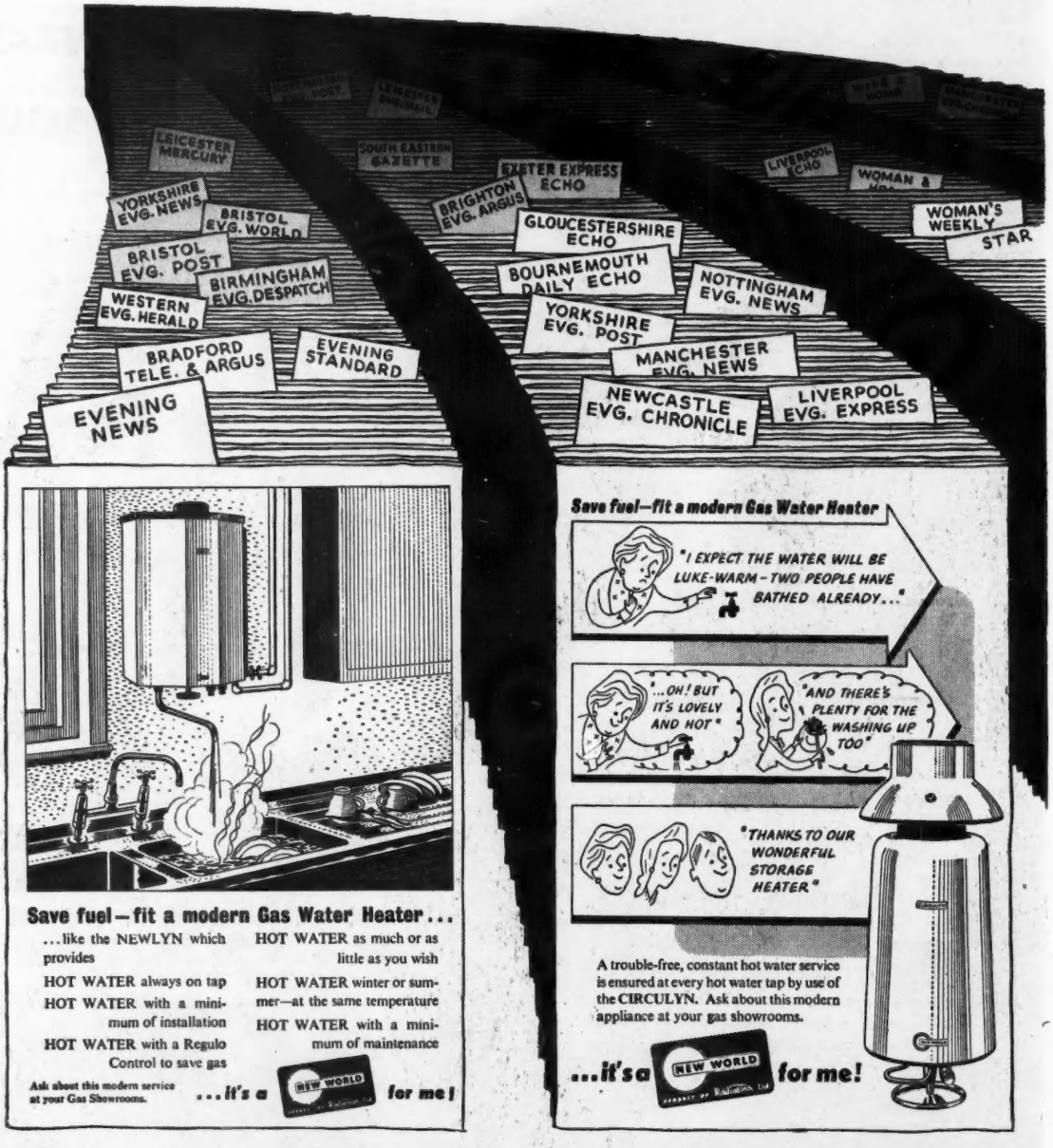
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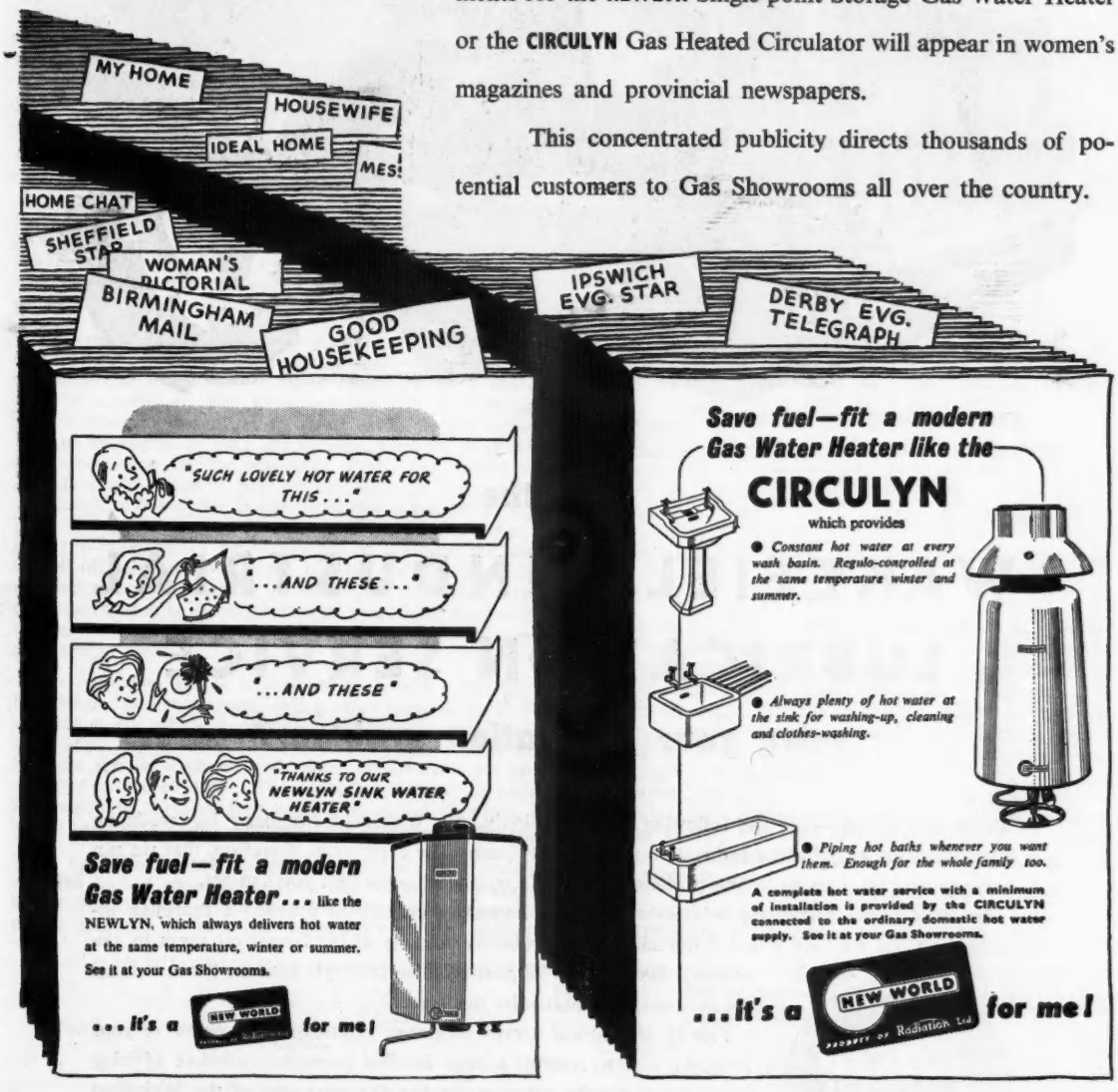
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(2) To liquefy the separated methane fraction together with methane vaporised in the storage tanks.

(3) To deal satisfactorily with solid-forming impurities in the raw gas, such as water vapour and carbon dioxide.

As the plant will only function for part of the year, cheapness of construction and ease of operation are of the utmost importance.

The flow-sheet of a suggested plant is shown on the left-hand side of Fig. 1. The intake coal gas, after normal purification from ammonia, sulphur compounds and benzol is compressed to 10 to 12 atm. The warm gas at this pressure is passed to a capacity vessel placed between the compressor and the after-cooler to remove oxides of nitrogen. The gas is then admitted to a set of reversing exchangers of the Collins [10] or McMahon [11] type, where it is cooled to around −110°C., most of the remaining impurities being deposited on the exchanger packing. Reversing exchangers are chosen rather than regenerators because they permit of a longer reversal period and hence reduce change-over losses at the pressure employed, and also because of the ease with which a return methane stream can be used without contamination to balance the exchanger, by flowing it through a third pass.

The cold gas is now passed through a coiled-tube cross-flow exchanger containing two return passes for the residual hydrogen-rich fraction. Here the gas is further cooled to about −135°C., a small amount of liquid rich in ethylene being condensed. The cold products from the exchanger are passed to a specially designed condenser in which most of the methane is liquefied, the residual gas leaving at −156°C. The details of this condenser are shown in Fig. 2. This design combines the function of condenser and rectifier.

The residual gas leaving the top of the condenser is cooled in a second coiled-tube exchanger to approximately −170°C., the further small amount of liquid condensed being fed back into the condenser. The remaining gas rich in hydrogen is then warmed in two stages to about −126°C. and expanded through an engine to near atmospheric pressure, so providing the refrigeration for the separation unit. The cooling effect is sufficient to allow a part of the methane fraction to be withdrawn as liquid, the larger part being taken off as vapour from the exchangers. The sub-cooled liquid from the condenser is throttled to near atmospheric pressure, the vapour flashed off being rejected to the residual gas line. Most of the remaining nitrogen, carbon monoxide, and hydrogen in the methane fraction is thereby removed. Part of the liquid methane is then fed back to the condenser, and the remainder piped to the storage tanks.

The expansion engine is required to handle a gas of very low density and to operate over a large ratio of about 7 : 1, a function for which a turbine is not readily suited. A reciprocating engine could be employed, but the machine would be large and its efficiency under such conditions could not be expected to exceed 50%. The authors are therefore engaged in developing a rotary type expansion engine in which it is hoped to achieve higher efficiency in a more compact machine.

An approximate analysis of this cycle has been attempted with the limited phase equilibrium and thermal data available (see Table 1), from which it is found that for an expansion engine efficiency of 70% the temperature of the residual gas leaving the engine is approximately −176°C. For 100 lb. mol. of inlet gas containing 26.5 mol. methane approximately 23.5 mol. of methane can be recovered, of which about 7 mol. will be liquid.

For a plant processing 100,000 cu.ft. of coal gas per hr. the output of methane will be 71.6 gal. liquid and 810 lb. vapour per hr. The work required by the compressor, assuming an isothermal efficiency of 60% is 335 kWh (450 H.P.). Approximately 23.5 kWh will be recovered by the engine (assuming an overall efficiency of 60%).

Since the minimum work of liquefaction of methane is 0.55 kWh per gal. and the minimum work of separation for the same weight of methane is 0.17 kWh, the thermodynamic efficiency of this cycle is approximately 25%.

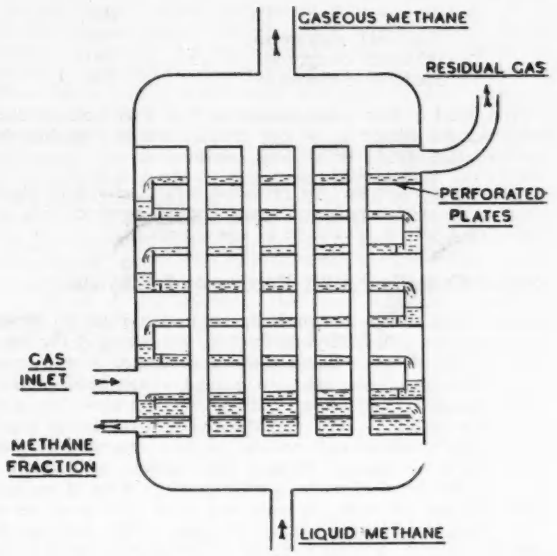

Fig. 2.—Suggested design for a condenser for separating the methane faction

For the liquefaction of the residual methane vapour together with that evolved in the storage tanks a further liquefaction unit is required. If the former duty were the only one to be accounted for, it might be better to incorporate a refrigerating cycle into the separation plant, so that all the methane product would be liquefied. However, during the period in which the storage tanks are cooling down, and also when a large amount of liquid is in storage, the amount of return methane vapour to be liquefied is large (at times exceeding the methane output of the separation unit), and at certain periods this load will continue when the separation unit is not running. A separation liquefaction unit is therefore preferred.

The work of liquefaction of methane has been calculated by Ruhemann [12] for various cycles, and he has shown the

TABLE 1.—ESTIMATED COMPOSITIONS AT VARIOUS POINTS IN THE COAL GAS SEPARATION PLANT.

Component	Inlet Gas 11·3 ata. 25°C.		After Exchanger 11·1 ata. −110°C.		Residual Gas Outlet 1·0 ata. 20°C.		Methane Fraction from Condenser 11·0 ata. −155°C.		Methane Fraction after Expansion 1·2 ata. −160°C.		Gas to Expansion Engine (Simplified) 10·0 ata. −126°C.	
	Mols.	Composition %	Mols.	Composition %	Mols.	Composition %	Mols.	Composition %	Mols.	Composition %	Mols.	Composition %
Hydrogen	52·0	52·0	52·0	53·6	51·8	72·0	1·4	4·6	0·2	0·7	50·6	77·0
Methane	26·5	26·5	26·5	27·3	3·2	4·4	23·8	78·0	23·3	83·2	—	—
Nitrogen	8·5	8·5	8·5	8·8	7·7	10·6	1·4	4·6	0·8	2·9	15·0	23·0
Carbon monoxide ...	7·0	7·0	7·0	7·2	6·4	8·9	0·8	2·6	0·6	2·1	—	—
Ethylene	3·0	3·0	2·3	2·4	0·7	1·0	2·4	7·9	2·4	8·6	—	—
Ethane...	1·5	1·5	0·7	0·7	0·8	1·1	0·7	2·3	0·7	2·5	—	—
Carbon dioxide ...	1·5	1·5	0·1	—	1·5	2·1	—	—	—	—	—	—
Total mols. ...	100·0		97·0		72·0		30·5		28·0		65·6	

'ata.' represents pressure in atmospheres absolute.

superiority of the cascade cycle. It might at first be thought that the complication and therefore the cost of the cascade cycle would largely outweigh the saving in power, but since the cost of compressors and prime movers constitutes a large fraction of the plant cost the overall saving with the cascade cycle remains large.

The suggested liquefaction plant is shown on the right-hand side of Fig. 1, the returning methane being admitted to either of three alternative points, depending on its temperature.

The power requirements of this cycle have been calculated for the required output of 300 gal./hr., assuming that methane is available at room temperature. The suction pressure of all compressors is taken as atmospheric, and their isothermal efficiencies at 60%. Reasonable allowance is made for temperature and pressure heads in exchangers and condensers. The load is as follows:—

	H.P.
Ammonia compressor	67
Ethylene compressor	194
Methane compressor	296

The total power consumption is 1.38 kWh/gal. When evaporated methane at a low temperature is available this performance would be slightly improved.

The compressor may be provided with electrical or steam drive. The wider range of speed control possible with the latter may give it advantage in some cases.

Separation Plant with Recovery of Ethylene

The additions to the methane separation plant to enable it to separate a 98% ethylene fraction, are shown in the lower part of Fig. 1. The liquid fraction condensed in the cross-flow exchanger is expanded to around atmospheric pressure and any carbon dioxide crystallising out is removed in a set of duplicate filters. The ethylene fraction, consisting largely of ethylene, ethane, and methane, is then separated by rectification in two stages. In the first column the fraction is stripped free from methane, a small amount of liquid methane being tapped off from the main separation unit to act as reflux, and the bottom product is used as the feed to the second column. Ethylene vapour of about 98% purity is the top product, and the reflux is obtained using a condenser at the top of the column cooled with liquid methane from the main unit.

Methane vapour from the first column and the condenser is joined with the main methane vapour stream before entering the reversing exchangers. The ethane product from the bottom of the second column is passed to the residual gas line.

Since the liquid fraction tapped to the ethylene separation unit is only about 4% of the inlet gas the size of the extra columns will be small. It will not be necessary to supply extra power to effect the ethylene separation, but the proportion of liquid methane produced by the parent plant will be somewhat reduced.

Modifications for Oxygen Production

The only modifications required to enable the plant to be used for air separation are the addition of an oxygen column and the replacement of one of the heat exchangers by an additional short 'unbalance' pass in the reversing exchangers. (See Fig. 3.) The operation for methane is substantially the same as before, and for oxygen production the remaining coil-tube heat exchanger is by-passed.

In the case of oxygen production, air is compressed to 6 atm. abs. and after traversing the after-cooler is cooled in the reversing exchangers to near its saturation point, leaving the water and carbon dioxide deposited in the exchangers. The air is then partially condensed in the rectifier-condenser, yielding bottom product around 45% liquid oxygen and fairly pure nitrogen vapour at the top. The former is expanded to atmospheric pressure and passed as feed into the oxygen column. The nitrogen after leaving the condenser is divided into two streams. One part is warmed up in the 'unbalance' paths of some of the reversing exchangers, and then expanded through the engine to provide the cooling for the system. The other is condensed in the lower part of the column, before being expanded and fed as reflux into the top of the column. The nitrogen top product joins the engine exhaust and is warmed somewhat in the remaining 'unbalance' passes of the reversing exchangers to reduce the temperature differences at the head of these exchangers and so ensure that the impurities are picked up by the scavenge nitrogen when it finally enters the main pass of the reversing exchangers. Liquid oxygen from the bottom of the column is run off into the condenser, and boils off inside the tubes. Part of this vapour is returned to the column, while the remainder leaves through the oxygen pass of the reversing exchangers to give a dry oxygen product of about 96% purity.

Design of Liquid Methane Storage

The project for separating and storing liquid methane at a gasworks hinges largely on the practicability of constructing safe storage vessels. Since the only experience so far available in this field was that of the East Ohio Gas Company, of Cleveland, U.S.A., it is of value to consider this installation and to endeavour to identify the reasons for its failure.

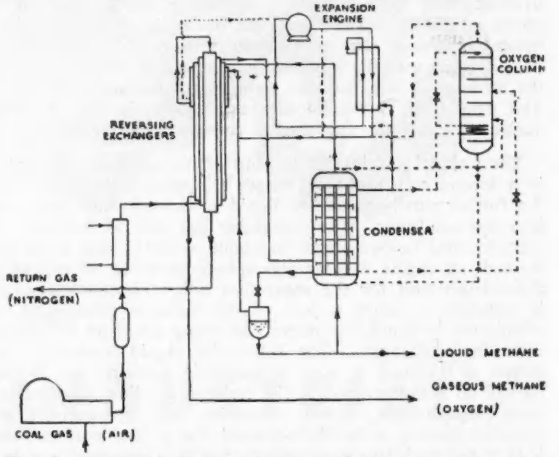

Fig. 3—Suggested layout for a methane separation plant, with provision for the production of oxygen.

The Cleveland installation provided for the storage of nearly 3 mill. gal. of liquid methane in three spherical tanks each of about 600,000 gal. capacity, constructed in January, 1941, and a larger cylindrical tank with torro-segmental ends of nearly 1 mill. gal. capacity, completed a year later'. The spherical tanks were constructed with an inner shell 57 ft. in dia., of 3.5% nickel, low carbon, steel supported by a 3 ft. layer of cork board inside a mild steel outer shell. The cork board only occupied about the lower 25% of the annulus volume, the upper part being filled with granulated cork. The use of cork board to carry the weight of the inner sphere eliminated the need for rigid supports extending through the insulation space leading to higher heat inleak and stress concentrations in the inner shell. The only points of direct connection between the two shells occurred at the top and bottom of the tank where pipelines were inserted, but here expansion joints were provided to take up movement between them. The shells were fusion arc welded. The outer shell was supported clear of the ground by a number of steel pillars attached to the circumference of the tank. The working pressure in the tank was from 5 to 8 lb./sq. in.

For the larger tank the cylindrical form was said to have structural advantages. With the further increase in diameter required it was stated that the bending stresses set up in a sphere along its greatest horizontal diameter might become

excessive due to the method of support. The cylindrical torrosegmental tank had an inner container 70 ft. in dia. and 42 ft. high. The walls of the tank were 3 ft. from the outer insulation jacket, and the insulation employed was rock wool. The materials of construction were as before, but the inner tank was supported by two rings of wooden columns.

Dams were erected around each tank, with connecting ducts to an overflow storage vessel. These dams, however, were not large, and were intended to deal only with small leakages of liquefied gas.

The disaster occurred in 1944, when the cylindrical tank failed and discharged its entire contents over the plant area and adjoining property at a lower elevation. Due to inadequate safety precautions and nearby sources of ignition, widespread fires and explosions resulted, causing the failure of one of the spherical tanks as well.

The investigations[9] into the cause of the accident, although very extensive in scope, proved largely negative in their conclusions. The main suggestion was that the steel employed for the construction of the inner shells was unsuitable for use at such low temperatures, particularly where the method of construction permitted the transmission of vibrations to the tank. In the Cleveland installation this was aggravated by the proximity of main railroads that ran adjacent to the plant. It was concluded in the report, however, that the scheme for liquefying and storing large quantities of liquid methane was not invalidated, provided proper precautions are observed.

As a result of this experience, and with the aid of further data, a design of installation for the storage of 1 mill. gal. of methane has been formulated. This design has been made bearing in mind the need to erect the tanks in the vicinity of a gasworks and, therefore, generally in a built-up area. Less stringent precautions would perhaps be allowable if the tanks could be installed in more remote places, but in most cases the length of piping required would make this quite impracticable.

Materials for Construction of Storage Tanks

Much information has been published recently on the strength of metals and metal structures at low temperatures[13]. It has been shown that whereas the mechanical properties of many non-ferrous metals improve appreciably at low temperatures, iron and low-alloy steels display a very rapid degeneration of impact strength and of stress resistance in triaxial loading. Some of these data are summarised in Table 2.

TABLE 2.—MECHANICAL PROPERTIES OF SOME METALS AT LOW TEMPERATURES.

Metal Composition %	Temp. (°C.)	Ultimate Stress (Tons/sq. in.)	Yield Point (Tons/sq. in.)	Elongation %	Impact value (Izod) (ft.-lb.)
Low-carbon steel ...	15	29·6	24·4	29·7	94·0
C =0·13 ...	− 65	36·0	30·2	33·6	49·0
Mn =0·68 ...	−180	54·2		26·5	3·0
Austenitic steel ...	15	41·4	16·5	54·0	114·0
C = 0·11 ...	− 20	51·0	19·0	62·5	—
Ni =10·05 ...	− 60	61·1	22·2	61·0	117·5
Cr =18·3 ...	−116	80·0	32·5	48·5	107·5
	−180	99·5	33·3	45·7	100·0
Nickel chromium ...	15	68·0	61·5	14·0	57·5
molybdenum steel ...	− 21	69·0	62·9	15·6	—
C =0·33 ...	− 60	73·2	64·0	14·0	—
Ni =2·54 ...	− 96	76·1	66·6	16·4	—
Cr =0·67 ...	−180	90·0	82·0	17·0	22·0
Mo =0·64 ...					
Aluminium ...	15	4·38	—	35·9	19·0
Si =0·054 ...	− 10	5·10	—	35·9	—
Fe =0·07 ...	−120	6·30	—	39·5	21·0
	−180	9·30	—	43·8	27.0
Copper (annealed)	15	14.0	—	48.0	43.0
Cu =99 985	−120	18.4	—	44.6	44.5
	−180	22.7	—	57.6	50.0
Brass	15	22.8	—	49.4	65.5
Cu =69·6 ...	−120	27·3	—	54·7	70·5
Fe = 0·1 ...	−180	32·8	—	74·6	78·5
Zn =30·5 ...					

Copper and aluminium are both seen to improve rapidly in all mechanical properties as their temperature is reduced, and this has been confirmed by very wide experience in the use of these metals in low-temperature plant. The high cost and rather low strength of copper count against its use in the storage tanks; however, aluminium would appear to possess very suitable properties. The technique of aluminium welding is now well advanced and information is available on the strength of welded joints. Although the authors are not aware of any existing vessels of similar size and shape in aluminium, they consider that its use should be seriously entertained for the given project.

The yield stress for steels is seen to improve rapidly with decrease in temperature, but the impact resistance is seen to deteriorate. The effect is very pronounced in mild steel and low alloy steel, but becomes much less marked as nickel is added until with an 18 : 8 stabilised austenitic steel it has virtually disappeared. A very similar phenomenon is observed with steels under a condition of tri-axial loading at low temperatures. Therefore, a stabilised austenitic steel can be used with confidence under conditions of high and irregular stress at low temperatures; and in cases where neither severe mechanical shock nor high complex stress concentrations are present steels with a lower nickel content are permissible. Thus, steels with 6% of nickel still retain considerable impact strength at low temperatures and would be quite reliable for the construction of tanks for liqid methane, provided that the design was appropriate. It is of interest to note that the three spherical tanks at Cleveland, which were constructed from steel containing only 3.5% of nickel, appeared to function quite satisfactorily, and the failure of one of them during the fire was apparently due to the collapse of its supporting column, and not, in the first instance, to the failure of the inner shell. On the other hand the cylindrical tank, which was made of approximately the same steel, but where the design permitted the transmission of shock and required higher localised stress concentration, failed under load. It is therefore considered that aluminium or stabilised austenitic steels can safely be used for storage tanks for liquid methane and also that low-carbon steels with a nickel content of at least 6% can be employed safely if the design can be so arranged as to avoid the direct transmission of shocks and the concentration of high complex stresses at points in the structure.

Insulation of Storage Tanks

Techniques for the vacuum lagging of tanks of the size contemplated for the storage of liquid methane have not yet been worked out, and, in fact, little incentive exists for doing so, since the scale factor enables the simple methods of insulation to be extremely efficient at these sizes. It is therefore required to select a suitable insulating material, to find its most economical thickness and to apply it with adequate precautions to prevent moisture penetration.

It has been suggested that for reasons of safety methane storage tanks should be underground, and calculations have been made showing that the insulating effect of the surrounding earth under these conditions could be appreciable. This principle is not recommended, however, due to the high earth pressures that result from the freezing of soils, and because it is desirable that the exteriors of tanks should be readily accessible for inspection.

Structural considerations make it desirable to use a rigid though resilient insulating material in the lower part of a tank so that it may be used to support the inner shell, and cork board is chosen for this purpose. In the upper part of a tank it is cheaper and more convenient to use a loose material that packs or pours into the insulation space. Table 3 shows the insulating properties at various temperatures of a number of possible materials. For the given installation, slag wool has been chosen for insulating the upper parts of the tank, since it combines the advantages of low thermal conductivity, non-inflammability, and comparatively low cost. The tank would be completely enveloped by an outer welded mild steel shell, which would serve to retain the insulation and prevent the ingress of moisture. This outer shell would be gas-tight, but would be provided with a number of breathing tubes carrying filters packed with a dessicant.

TABLE 3.—PROPERTIES OF SOME INSULATING MATERIALS

k=B.Th.U./(hr.) (sq. ft.) (deg F. per ft.).

Material	Density (Lb. per cu. ft.)	Thermal Conductivity at 0°C.	Thermal Conductivity at −183°C.
Asbestos	44.0	0.135	0.100
Asbestos	29.0	0.0894	0.0545
Cotton	5.0	0.0325	0.0198
Silk	6.3	0.0290	0.0155

		Thermal Conductivity at 15°C.	Thermal Conductivity at −160°C.
Granular vermiculite ...	13.5	0·040	0·019
Slab cork	6 4	0 023	0·011
Slag wool	12·3	0·024	0·009
Slag wool	7·4	0·020	0·008
Silica aerogel	5·0	0·012	0·007

Storage Tank Design

In deciding the size and number of tanks to accommodate a given volume of liquid a compromise must be struck between conflicting requirements. Thus, considerations of cost favour a few very large tanks, while safety aspects favour a larger number of smaller tanks. Study of the evaporation losses indicates a middle course, for when the maximum amount of liquid is in store minimum evaporation is obtained with one large tank; but when only a part of the storage capacity is utilised smaller evaporation losses are obtained in a small tank completely filled than in a larger tank only partially filled.

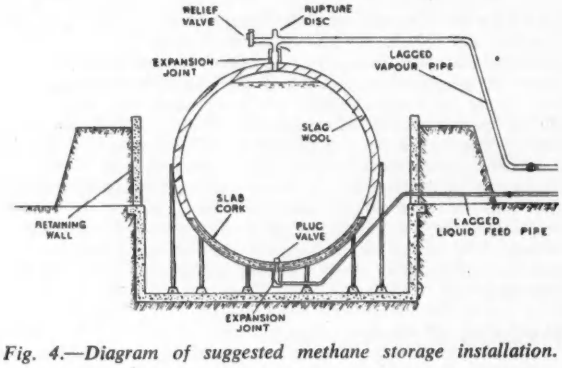

Fig. 4.—Diagram of suggested methane storage installation.

While in any given installation this choice could only be made after a detailed study of these factors, in the given case the number of tanks has been rather arbitrarily chosen as four.

The spherical shape has been chosen, since the evaporation losses for a given volume and gicen thickness of insulation will be a minimum, and also because the constructional difficulties will probably be less than those for a cylindrical tank with dished ends and of equivalent volume. To accommodate 1 mill. gal. in four spherical tanks, allowing 5% ullage, requires spheres with an inner diameter of 43.25 ft. The cork board installation will extend to one-quarter of the height of the tank, and the remainder will be packed with the slag wool. The outer mild steel shell will be supported on structural steel columns.

The evaporation losses from a tank of 250,000 gal. capacity, insulated with cork and slag wool to various thicknesses, is given in Table 4. The evaporated methane will normally be re-condensed in the liquefier and returned through lagged pipe-lines to storage.

TABLE 4.—EVAPORATION LOSSES FROM A 250,000 GAL. TANK. USING CORK AND SLAG WOOL INSULATION.

Insulation thickness (Ft.)	Evaporation (Gal. per day)	Capacity per day %
1	850	0·34
2	445	0·18
3	310	0·12
4	242	0·10

The optimum thickness of lagging for this tank has been shown to be approximately 2 ft.[4].

The liquid methane is conveyed from the liquefier to the storage tanks through pipelines constructed of a non-ferrous material such as copper or aluminium. Efficient lagging is required to prevent excessive boiling in the pipe, and for this purpose the use of evacuated lagging is recommended. Experience with a 60 ft. length of pipe lagged with 1 in. thickness of silica aerogel evacuated to 0.1 mm. Hg. pressure has been very satisfactory.

The liquid pipe is brought into the bottom of the tank through a copper bellows that takes up movement between the two spheres. The same pipeline is later used for the withdrawal of liquid. A plug valve is installed at the junction of the pipeline to the bottom of the inner shell, and it is operated at a distance by a cable and linkage. Vapour generated in the tank is conducted away through a large-diameter lagged pipe, attached through an expansion joint to the top of the sphere, and is returned to the liquefaction plant. The vapour pipes must be large enough to take the full output of the liquefaction plant after vaporisation without generating a pressure of more than 2 to 3 lb. per sq. in. in the tank.

Safety Precautions

As a precaution against excessive pressure build-up in the tanks, each is fitted with duplicate safety valves loaded to lift at 8 lb./sq. in., and a rupture disc that would fail at very slightly higher pressure at the low temperature. The pipe leading to these safety valves and disc must be short and of wide diameter. Each tank is provided with a float-operated liquid level gauge with a tell-tale on the tank, and with a remote recorder. All valves at low temperature are fitted with extended spindles and remote packing to avoid frosting up.

All the outer parts of the tank will be easily accessible for inspection and properly ventilated. A continuous analysis of air samples in the neighbourhood of the tanks could also be made to identify rapidly any methane leakage.

The use of high-nickel alloy steels or of aluminium for the tank construction makes the possibility of failure very remote indeed, but adequate precautions against such a contingency can be provided. It is suggested that the tanks should be placed in pits 60 ft. square and 15 ft. deep lined with reinforced concrete. The pits have a capacity in excess of that of the tank, so that in the event of tank failure the liquid would be retained. As a further safety measure a retaining wall 20 ft. high might be built around the perimeter of the pit, and the excavated earth mounded against it. The further capacity provided by the wall would eliminate the danger due to violent frothing if liquid were discharged into the pit. No doorways through the retaining walls would be permitted, and all control valves would be installed outside the wall.

The fire hazards associated with the storage of liquid methane, and the methods of extinction to be used in case of fire, have been investigated by Burgoyne and Richardson.[14] It is shown that although liquid methane is much more volatile than petrol its lower limit of inflammability is about four times greater, and its ignition temperature much higher. (See Table 5.)

TABLE 5.—'STANDARD' LIMITS OF INFLAMMABILITY IN AIR

	Lower %	Upper %
Methane	5.3	13.9
Petrol	1.4	6.5

IGNITION TEMPERATURES

Methane ...	650°C.	n-heptane ...	255°C.
n-pentane ...	470°C.	n-octane ...	245°C.
n-hexane ...	275°C.	iso-octane ...	530°C.
		benzene ...	500°C.

Insulation thickness (Ft.)	Evaporation (Gal. per day)	Capacity per day %
1	850	0.34
2	445	0.18
3	310	0.12
4	242	0.10

It appears, therefore, that the risk of ignition near a well insulated storage tank containing liquid methane is probably less than with a petrol tank of similar size. Even in the event of tank failure it is unlikely that ignition will occur,

provided that sources of ignition in the immediate vicinity of the tank are eliminated. Should the liquid methane discharged into the pit catch fire, it has been shown that foam can be used satisfactorily for fire extinction. For small methane fires, carbon dioxide extinguishers have been shown to be effective. Extinguisher equipment of both types should, therefore, be provided in the plant area.

A further problem that, in the event of tank failure, would have to be considered is the disposal of the large quantities of liquid methane from the pit, since its presence would constitute a potential hazard and its disposal by natural evaporation might take a considerable time. The rapid and complete pumping out of such a quantity is not considered practical, although as much as possible would be reclaimed by the normal pump and re-gasification system, should these have remained intact. To promote evaporation of the remainder, provision would be made for pumping water, in the form of a fine spray, into the pit; the freezing of the droplets and their subsequent cooling to −160°C. would be used to supply latent heat for evaporation. It has been calculated that 1 gal. of water at normal temperature will evaporate 2 to 3 gal. of methane when used in this way. The falling spray would also be useful in dispersing froth on the boiling methane.

Cost of Liquid Methane Installation

The costing of a plant that involves original features and the development of certain new constructional techniques is always rather uncertain. This can be guarded against by costing the plant as a prototype and, therefore, allowing generous development charges. However, to compare the cost of a process charged in this way against those of already well-established processes is scarcely satisfactory, and the following data are therefore presented on the basis that the greater part of this development work will already have been carried out. (Costs are based on mid-1950 values.)

Gas Separation Plant	£	£	£
Coal gas compressor with motor (installed)		28,000	
Expansion engine	2,000		
Cold box (exchangers, condensers, etc.)	10,000		
	12,000		
Installed (x 4)		48,000	
Total cost			76,000
Gas Liquefaction Plant			
3 compressors and motors (installed)		26,000	
Cold box	9,000		
Installed (x 4)		36,000	
Total cost			62,000
Storage Tanks			
Four stainless steel inner shells (½ in. plate, charged at £600/ton)	125,000		
OR			
Four aluminium inner shells (⅜ in. plate) (estimated)	100,000		
OR			
Four inner shells in 6% nickel steel (estimated)	100,000 say	125,000	
Four outer mild steel shells (£150 to £200 per ton)		50,000	
Insulation (cork and slag wool)		20,000	
Civil engineering (excavation, shuttering, concrete)		20,000	
Piping and fittings		50,000	
Total			265,000
Total cost of liquid methane installation			403,000

Cost of Liquefaction of Methane (per gal.)

(This figure is used in determining the optimum thickness of lagging, and it does not include the cost of separating methane from coal gas.)

Capital charges £62,000 at 15%	1.52d.
Power (1.38 kWh at 0.75d./kWh)	1.04d.
Labour and supplies	0.50d.
Total liquefaction cost	3.06d. per gal.

Cost of Stored Methane (per therm)

For a total storage of 1 mill. gal. liquid methane (925,000 therms).

Capital charges (15% on £403,000)	15.8d.
Cost of methane	3.0d.
Power (at 0.75d. per kWh)	2.8d.
Materials and supplies (including cooling water)	1.0d.
Labour and supervision	2.1d.
Total cost	24.7d. per therm

The separation plant used with air will produce approximately 19 tons of 96% oxygen per day, and will consume approximately 260 kW. The power consumption will therefore be 12 kWh per 1,000 cu.ft. of oxygen product (9d. per 1,000 cu.ft. at 0.75d. per kWh). The only remaining charges to be placed against oxygen are those for materials and services and for the capital charges on the additional plant. The oxygen should therefore be available at about 1s. per 1,000 cu.ft.

When the plant is used to produce ethylene it will recover 1.8 mols of ethylene out of 3.0 mol % in the inlet gas, and the total production of ethylene will be 1½ ton per day. The only charges to be made against this ethylene during the summer months will be capital charges on the additional plant (estimated to cost about £10,000) and the power for re-liquefying the methane reflux. During the winter months the power required to compress the inlet gas to about 7 atm. must also be charged.

Comparison with other Peak Demand Processes

While it is unreasonable to attempt at this stage the establishment of a fine balance between the cost of liquid methane and that of other processes, it is interesting to make a general comparison. Data have been published by Birks [15] giving representative costs of various existing gas-making and storage methods on the basis of the number of operational days per annum. To this data, reproduced in Fig. 5, have been added

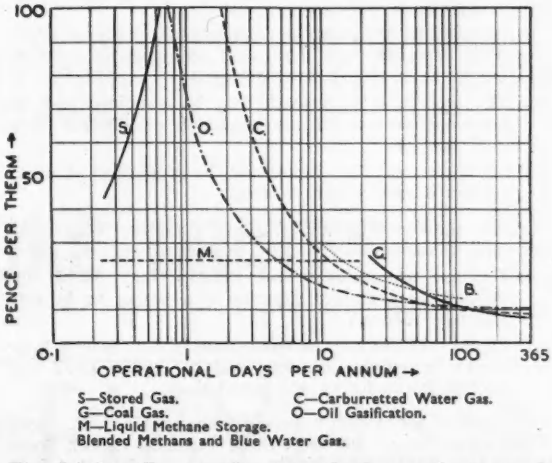

Fig. 5.—Overall cost of gas productions and storage for different systems, with various load factors.

two further curves. The curve B gives the cost per therm of gas of 500 B.Th.U./cu.ft. produced from blue water gas enriched with stored methane. Purified blue water gas for a plant running 200 days per annum is costed at 7d. per therm, of which 1.4d. represents labour and capital charges. For water gas plant functioning over shorter periods the labour and capital charges are scaled up in proportion. The further curve M is for direct enrichment of town gas with methane at times of exceptional demand to produce a final gas with calorific value slightly in excess of 500 B.Th.U./cu.ft. The line M is horizontal because, being a storage process, the cost of methane is the same whether the tanks are emptied in five or in 50 days.

In the operational range from 10 to 100 days per annum the blended gas B is seen to be slightly more expensive than carburetted water gas C (based on 1948 oil prices). Three additional factors require to be considered, however. Firstly, in drawing the curve B no account is taken of the fact that the use of methane storage improves the load factor on the base-load plant. From curve G in Fig. 5, it is apparent that small improvements in the load factor of the carbonisation plant will materially reduce the cost of the base-load gas, and this factor will offset the increased cost of the blended gas. Secondly, if the methane separation plant were adapted to produce oxygen during the winter months this oxygen could be used to increase greatly the output of the water gas plant and, therefore, to reduce the water gas cost at this load factor. The production of oxygen in this way may therefore be used to reduce the cost of the blended gas. Thirdly, it may be noted that the level of curve C is dependent on the price of oil, and increases above 1948 oil prices affect the position substantially.

In the range of load factors from five to 20 days, direct oil gasification appears to offer the most economic solution. However, the gas produced by existing oil-cracking processes can only be used in town gas to a limited extent because of its adverse effect on combustion characteristics. For short-term peak loads direct methane enrichment is seen to possess considerable advantages over all other processes, and in addition reduces overloading on the distribution system.

Advantages of Liquid Methane Storage

The advantages of liquid methane storage are summarised as follows:—

(1) It affords a competitive method of meeting seasonal load variations in the demand for town gas without resorting to the use of imported fuels, and without interfering with the combustion characteristics of the distributed gas.

(2) It improves the load factor on the base-load carbonisation plant.

(3) It provides a means of economically meeting severe peak demands, with the added advantage of reducing overload on distribution systems.

(4) The separation of methane may be combined with an economic process for the extraction of ethylene from coal gas; or

(5) The plant may be adapted for the production of cheap oxygen during winter months.

Certain additional factors of a more remote, but not insignificant, character may also be mentioned:—

(6) The use of liquid methane storage may enable the amount of gasholder capacity at a works to be substantially reduced.

(7) Liquid methane may be transported in bulk from a large works to outlying districts, and so replace small and necessarily inefficient gas installations.

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DISCUSSION

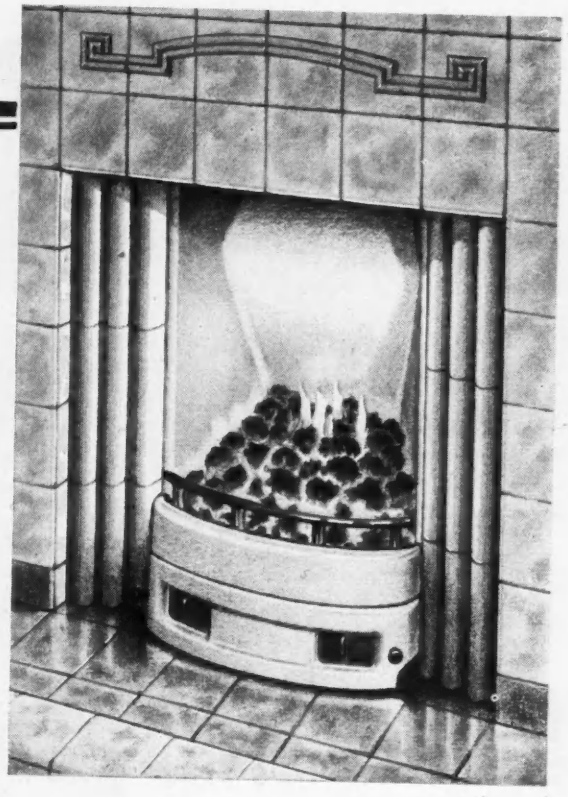
Sir Alfred Egerton, F.R.S.: Some years before the war I suggested that the storage of liquid methane on a large scale might overcome some of the problems of the gas industry. The same B.Th.U. can be stored as liquid in a space only one-thousandth of the volume required for their storage in the form of gas. In the U.S.A. the same views as to the possibility of using liquid methane to alleviate the winter gas demand had arisen, and with characteristic *elan* they put up a large plant for this purpose at Cleveland, to avoid duplicating their natural gas pipes from Virginia. I saw that plant in 1942. It was a fine plant, and was working then most successfully, but I remarked when shown round that it seemed rather hazardous to place the big holders so close to the houses and streets. As you know, disaster ensued, but I believe that this would have been avoided had proper precautions been taken in the siting of the plant.

We have been rather fortunately situated in the study of the safety aspects, because our laboratory has been the centre, during the war and afterwards, for research on fire prevention, and we were able to use of the experience and methods developed for experiments on such problems. Dr. Burgoyne made a study of liquid methane fire hazards which has been published in the journal *Fuel*. Dr. Haselden has taken full note of this in the design of the storage vessels which he has presented to you. Provided proper precautions are taken, the fire hazard should not prevent the application of the scheme.

Dr. Haselden has made it clear that the scheme does meet the short-term peak load problem in a way which no other scheme can do so economically, while the methane-enriched water gas competes quiet favourably with carburetted water gas. That is on the basis of the cost figures which the authors have presented, and about which you will probably require further information. The work has been carried now to the stage when further consideration should be given to the construction of a pilot plant on a reasonable scale. It is sometimes said that low temperature plant suffers from high maintenance costs, but I am not convinced that low temperature plant designed on modern lines should be subject to maintenance difficulties. It is largely a question of careful design. I should like to congratulate the authors on having taken the subject a very considerable step further.

A Game of Leapfrog

Mr. J. E. Davis (S.E. Gas Board): The gas industry, in common wih many other public services, cannot avoid peak loads if it is going to give a service. It need not seek them, but quite a lot of them, and quite embarrassing ones, will come on their own. When we look at alternative methods of meeting peak loads and the cost of doing so, the figure of 24.7d. per therm, frightening though it would be for base load, and quite prohibitive, is not nearly so frightening as some of the other methods, as indeed has already been shown by Mr. F. M. Birks. However, I do not think that at the present time one can argue too much about the comparative costs of this or that alternative method. Coal and oil prices are playing a game of leapfrog. At some periods while this matter has been under consideration the importance of avoiding the use of imported raw material has been paramount. At one time the recovery of ethylene from coal gas seemed to be a matter of prime national importance. With the growth of oil refineries in this country it may be that those oil refineries will provide ethylene much more simply and cheaply than it can be recovered from car-



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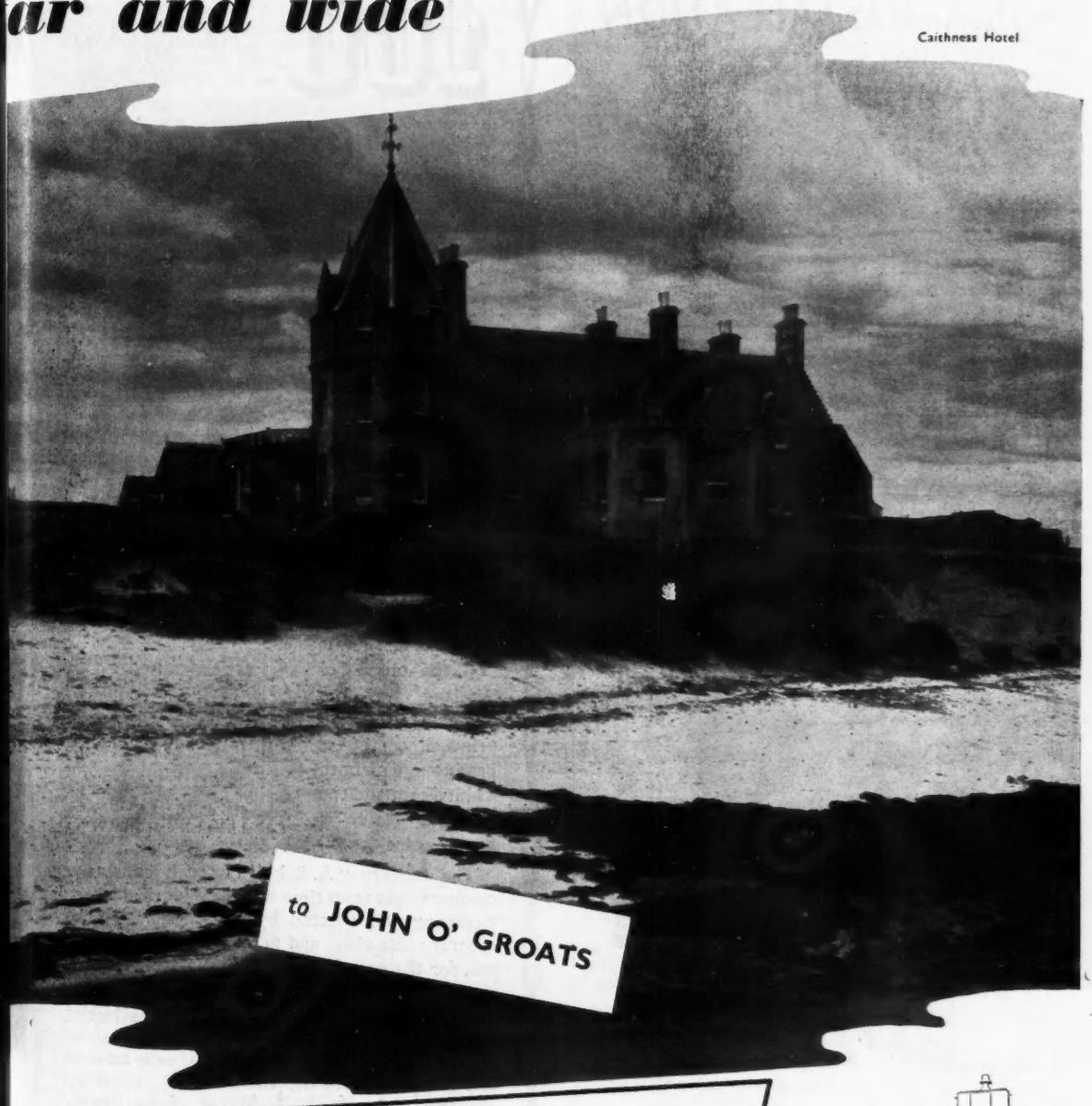

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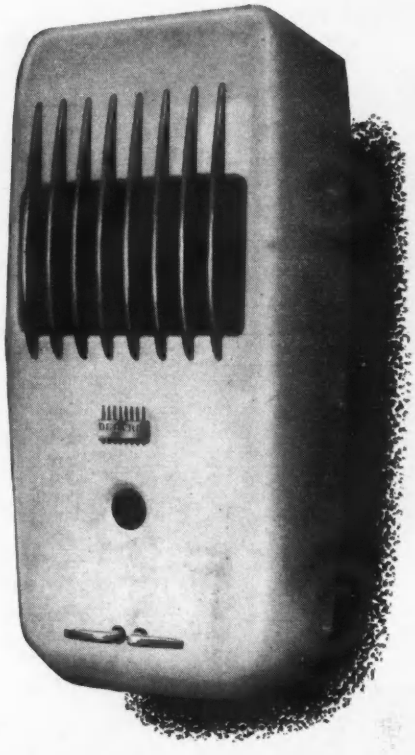

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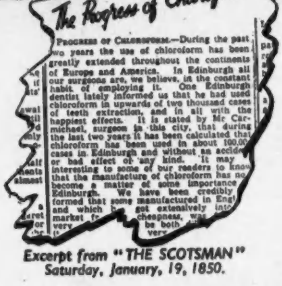

The Progress of Chloroform

PROGRESS OF CHLOROFORM.—During the past two years the use of chloroform has been greatly extended throughout the continents of Europe and America. In Edinburgh all our surgeons are, we believe, in the constant habit of employing it. One Edinburgh dentist lately informed us that he had used chloroform in upwards of two thousand cases of teeth extraction, and in all with the happiest effects. It is stated by Mr Carmichael, surgeon in this city, that during the last two years it has been calculated that chloroform has been used in about 10,000 cases in Edinburgh and without an accident or bad effect of any kind. It may be interesting to some of our readers to know that the manufacture of chloroform has now become a matter of some importance in Edinburgh. We have been credibly informed that some manufactured in Engl... and which ... got extensively into ... cheapness, ... be both ... very ...

Excerpt from "THE SCOTSMAN" Saturday, January, 19, 1850.

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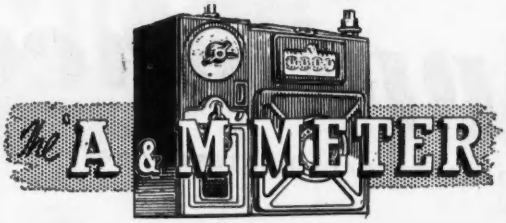

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bonisation gases. We are becoming accustomed to sudden swings round in the whole economic position. One year we are told that we should use more oil; next year there is no oil at all, so we cannot use it, and we use coal; next, there is no coal, so back to oil we go.

For the present, I think that it is only fair to the authors to say that I personally do not see much chance of this particular process being installed. We are all familiar with the position that, with the rising output of the gas industry, the peak load plant that we are building now will be base load plant before the next plant which is on order is completed, which is something like five years, so that we do not want to get any plant which is too remotely different from our ordinary gas-making plant, as this scheme most certainly would be.

Conditions, however, may change. If I may hazard a guess as to where this method of long-period storage is most likely to be used, I think it will be if ever the gas industry receives gas over long-distance transmission lines, perhaps from pithead gasification, and then I think in the town the storage of liquid methane may well be most attractive, bearing in mind this difference between the storage of liquid methane and other means of gas load peak production—that this gas is purified in storage, and for a 40 mill. a day works to have a storage of 200 mill. of purified gas would make the gas engineer feel much happier when the cold weather came.

Mr. A. R. Myhill (W.M. Gas Board): It occurs to me that the size of the typical works which the authors have selected is very large, and I should like to know how the cost figures for a very much smaller works would compare with those given in the paper. The works selected is about 40 mill. cu.ft. per day, and I do not know how many works in this country make such a quantity of gas; I imagine only two or three, possibly, in the London area. What would the cost be for a works one-tenth of that size?

Dr. G. G. Haselden: The cost of storing methane would definitely be higher on a one-tenth scale. Speaking perhaps rather generally—we have not given this aspect of the matter very much study—down to about one-quarter the size of our published installation there would be very little increase, but the extra cost would go on increasing logarithmically, and—though this is merely a guess—for a plant of one-tenth the size I should think that the cost of storing therms might well be 50% in excess of that given in the paper.

Adequate Safeguards

Dr. R. F. Strickland-Constable: What strikes me about the Cleveland disaster is that so far as this country is concerned it need not worry anybody at all, because in this country any inflammable liquid which is held in a tank must be subject to certain safeguards, and by law a bund has to be provided round the tank of a size which I believe is laid down in regulations. In Ohio there seems to have been an absence of suitable regulations, and the tanks were placed up against houses.

I should like to have explained to me why the solution of this problem, and of another problem, might not depend on the gas industry, in the course of a long periods of years, reducing the calorific value of the gas which it delivers. That would involve, I imagine, a modification of the appliances which are sold to the public; but, as the process could be a gradual one and spread over a number of years, it seems to me that that might provide a long-term solution, because it would then be possible to use and distribute blue water gas with a comparatively small amount of coal gas in it. That would not merely help the peak load problem, but would also to a certain extent help to solve the problem involved in the fact that the gas industry's market for coke is not always equal to the amount of coke produced.

Mr. L. T. Michin: It is extremely important that this paper has been put before the gas industry, because we are badly in need of new ideas and new approaches to problems. All the same, I find it hard to believe that this is a practical method of dealing with the peak load problem. There are other methods of making peak load gas at lower cost than this, and they involve *making* gas, whereas this is a procedure for storing gas at one time of the year and using it at another. I am thinking particularly of electrical methods of carbonising, which from experiments in Norway at the present time can be done for 2d. to 3d. a therm, and that is actually making gas and the plant could be used for base load if required, provided, of course, that the current was taken only during the early hours of the morning or the middle of the night, when it is available from the electricity generating stations. It seems to me that that is a rather more likely solution to the problem than the liquefaction of methane.

Mr. S. Muller: I should first like to say how much I have enjoyed reading this paper, with its attempt to sell methane to the gas industry by the gallon. The gas industry has always considered its gaseous products under very broad headings, such as 'coal gas,' 'producer gas,' and 'water gas,' and has been almost exclusively concerned with the calorific value, specific gravity, and combustion characteristics of the gaseous mixtures. There is in this country to-day a growing chemical industry which does not regard gas in this light, but purely as a mixture of constituents, some of which, notably the olefinic gases, can be used as basic materials for the synthesis of a diverse range of products once they can be separated in a relatively pure form.

Such separation has already been carried out on an enormous scale in America. Until recently, this country has had to rely on the American production for the new materials concerned, but plants have been built or are being built which will go some way towards supplying our needs. The company which I represent is already operating a gas liquefaction and gas separation plant for the production of olefinic gases in this country.

Enormous Capital Charges

The use of stored liquid methane for gasworks peak load must be judged primarily on a basis of cost, and the paper indicates that all other cost items are overshadowed by the enormous figure of 15.8d. per therm for capital charges. I should like to consider the implications of developing a liquid methane storage installation in conjunction with an existing plant of a type designed to separate olefinic gases in an oil cracking process.

Production is assumed, as in the paper, to be 1 mill. gal. of liquid methane a year, produced at a steady rate throughout the year. The methane is assumed to be necessarily produced in liquifying ethylene and propylene. It is presumed that the scheme envisaged in the paper would produce a fixed quantity of methane for the beginning of the winter season, and it would gradually be depleted for peak load purposes, so that when the severest peaks occurred perhaps only 50% of capacity would be available for use. The modified storage installation is therefore assumed to be of only 500,000 gal. capacity. The operating cycle is as follows:

May to August, methane to storage only. Storage two-thirds full by the end of the period.
September to December, gasworks offtake for minor peak loads. Storage full at the end of the period.
January to April, gasworks offtake for heavy peak loads. Storage empty at the end of the period.

During off-peak loads in the third period it should be possible for the chemical works to increase the quantities fed into storage by adjustment of its own internal load, in order to maintain as high a stock of methane as possible.

Under these conditions the capital cost of the storage installation is halved without materially affecting the quantity of stored methane available for really heavy peak loads in mid-winter. The capital cost of extra plant for increased liquefaction of methane is taken at £30,000, or less than one-quarter of the complete separation plant in the case of the coal gas installation. Power costs for liquefaction are taken at 1.4 kWh per gal. of methane, and power to make up storage losses at 1 kWh per gal., which is comparable with the figures taken in the paper. Materials and supplies are taken at half the cost given in the paper, and an extra item is added for maintenance, at 2% of the capital value per annum. Labour and supervision are only those required for the storage installation and would not be expected to exceed £2,000 per annum. The basic cost of methane would be higher than the figure of 3.0d. per therm assumed in the paper, due to the higher cost of the raw material, and the comparable figure of 7d. per therm might be estimated.

The logical place for the storage installation would be at the chemical works, so that it would probably be necessary to evaporate liquid methane and deliver by pipeline to gasworks. No attempt has been made to assess the cost of this operation, as it would depende on local circumstances;

but it is considered that the total cost would not be substantially increased under favourable conditions.

Comparative figures have been prepared for the two installations. I do not propose to deal with them in detail, but they indicate a cost in the case of the chemical works installation of 17d. per therm, compared with a cost of 24.7d. per therm for the coal gas installation, using similar assumptions. From these figures it seems that the cost of peak load methane from an existing plant would be about two-thirds the cost of production from coal gas, in spite of the much higher cost of the raw material in the former case. It is visualised that such an installation would be completely controlled by the gasworks as regards output from storage, so that the prudent gas engineer would ensure an adequate reserve to meet maximum peak loads. Operational control of the plant itself would rest with the chemical works.

The utilisation of cracker gas and propane is dismissed somewhat summarily in the paper on the ground of the non-indigenous source of the raw material; but, in spite of this, the considerable expansion of refinery and petroleum chemical installations will certainly produce quantities of these products, which will be available for suitable outlets. The delivery of tail gas to the gas industry is already an established fact at Manchester, and, although this type of supply is most suitable for base loads, arrangements in the refinery will usually allow some latitude for peak supply. Propane systems as used in France might well merit consideration for small, isolated works, though the high price of bottled propane for other applications will weigh heavily against its use in large works except for ultra-peak loads.

Finally, if anybody is thinking of liquefying methane from coal gas and is willing to supply ethylene at 3d. per therm plus the power cost for liquefaction plus the capital charges on £10,000, will they please site the plant at Manchester? I think I can arrange for the disposal of the ethylene!

Cost of Separation

Mr. A. M. Clark: In regard to the basis of the cost of methane itself, the authors claim, I think, a thermodynamic efficiency of 25% for the separation. That, in fact, is more than three times the efficiency which has yet been achieved in any gas separation process. As the cost of gas separation processes is always dominated by the cost of power, that is a matter which deserves careful examination.

The other point, which I particularly want to mention, is where the authors arrive at a cost of 1s. per 1,000 cu.ft. for oxygen which is produced on a marginal basis. These costs on a marginal basis are always very uncertain. A few years ago there were many statements in American literature about the low price at which oxygen might be produced and the wonderful schemes which might be built on the basis of cheap oxygen. The cost figures which were given always discounted certain things which apparently were free. In the case of some of the American estimates, I think that power was available in unlimited amounts without charge. The fact is, however, that although the Americans launched out with their usual *elan* on these schemes, the schemes seem to be flagging rather badly at present, and many of the very optimistic expectations which were entertained of them appear to be doomed to at least partial disappointment.

The present authors have apparently discounted any capital charges on their oxygen production, and it does not appear to bear any maintenance costs. The labour used would be sitting idle for some of its time if the plant were not run to make oxygen. Almost the whole of the authors' 1s. per 1,000 cu.ft. is made up of the cost of power, and even there I am a little surprised at the fact that apparently they achieve a power consumption of 12 kWh per 1,000 cu.ft. I calculate that that is rather lower than has yet been achieved by any oxygen plant which has so far been erected, and it would be rather remarkable if a plant which was designed for an entirely different purpose had in fact a higher efficiency than any which have been specially designed for the job.

Dr. G. G. Haselden: Mr. Muller made an excellent presentation of the case for methane from oil, and his statement of the case may very well be correct. We could reproduce that to some extent by cutting down the amount of liquid methane in storage, adding a small amount to the carbonisation plant, and so running the separation plant for a larger fraction of the year; in fact, we could run it throughout the year and be continuously topping-up the methane supply. That is a variant which we have not considered, but it may be worth consideration.

In reply to Mr. Clark, I am a little mystified by his remarks about the figure which we have given for the efficiency of our unit, which we claim to be 25% of the thermodynamic optimum.

Mr. A. M. Clark: I should have said that that is twice the efficiency so far obtained, not three times.

Dr. Haselden: I am still not prepared to accept twice. I am under the impression that some of the most recent oxygen separation plants have a thermodynamic efficiency of 18-19%, whereas a good cascade liquefaction plant of the industrial type has a thermodynamic efficiency of as much as 35-40%. As our plant couples a liquefaction cycle and a separation cycle, it would seem that our figure of 25% for the overall efficiency of the cycle is not unreasonable.

Our figure of 1s. per 1,000 cu.ft. for oxygen does seem to be a very generous one. That, of course, is due to the fact that since in costing the methane we allowed for the capital charges on the plant throughout the year and the staffing of the plant throughout the year, it would seem to be justifiable to cost the oxygen in the way that we have. Presumably a more adequate way of setting about the costing problem would be to share the capital charges and labour charges between the charge for methane and the charge for oxygen, in which case we should have brought our methane charge down slightly and increased the oxygen charge; but the method which we in fact adopted seemed to be a reasonable and fairly simple way of presenting the case. With regard to our figure for power consumption for the production of oxygen, I was under the impression that the figure of 12 kWh per 1,000 cu.ft. was comparable or identical with that claimed for the Linde-Fränkl plant.

Mr. A. M. Clark: Claimed, but not necesarily achieved.

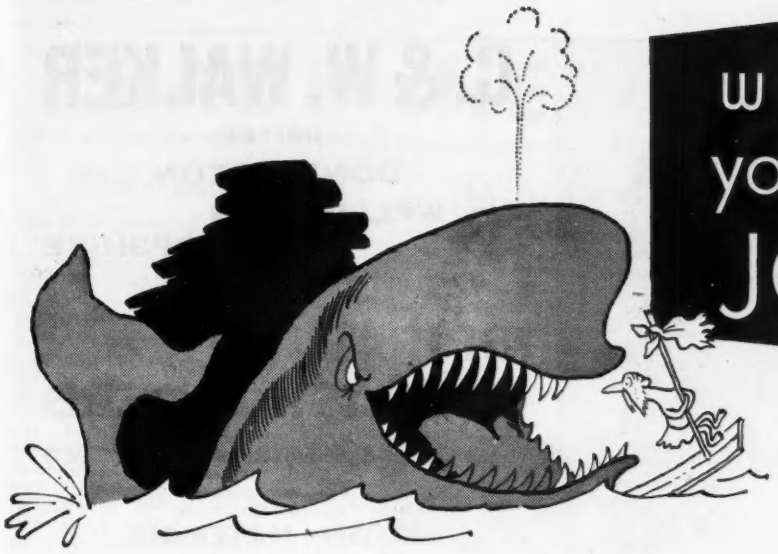
Dr. Haselden: I should think that our figure is 10% better than has been claimed for the Linde-Fränkl plant, and probably more than that better than has been achieved.

A More Moral Way

Mr. J. H. Dyde (Vice-President, Institution of Gas Engineers): We are, in common with other fuel industries, intensely interested in all matters connected with meeting the peak demand, the particular bane of the electricians. I do not know, however, that I ought to use that word; they have a very simple solution, because they simply shed the load. We are a little more moral in the way that we meet our obligations, and I think that we are the envy of our competitors, in so far as our whole process does present a flexibility which certainly they have no way of achieving. We have storage, we have base-load plant, we have orthodox peak load plant, and we have special peak load plant and oil gasification. Possibly we may also have the tail gases of refineries, and even large quantities of bottled gas delivered to gasworks sites in the future. However that may be, we have had presented to us to-day the development of an idea which may well provide another means of meeting this difficulty, the peak load problem.

The success of the meeting is due to our two authors and also to those who have come forward to make such excellent contributions to the discussion, and I should like to couple with the vote of thanks which I now propose to the authors our thanks to our Chairman, Mr. Birks, the President of the Institution of Gas Engineers.

Mr. A. G. Grant (Whessoe, Ltd.): There must always be a step between the results of research and the thought arising from them on the one hand and their application in industry on the other. That step always requires courage and imagination. My impression of this paper is that the authors have left us with a very much smaller step than we often have to take. The liquefaction and separation process is well known, and many of us get liquid oxygen delivered to our works every day. The authors have shown that this can be done in the case of coal gas by the separation of methane. They do not need to demonstrate that liquid methane can be stored, because Cleveland demonstrated that. It seems to me, therefore, that the authors have put the gas industry on its mettle, and I hope that some of those who are responsible for looking ahead will start to do some arithmetic on the assumption that separation and re-use is practicable and consider whether the economics justify pilot plant investigation.



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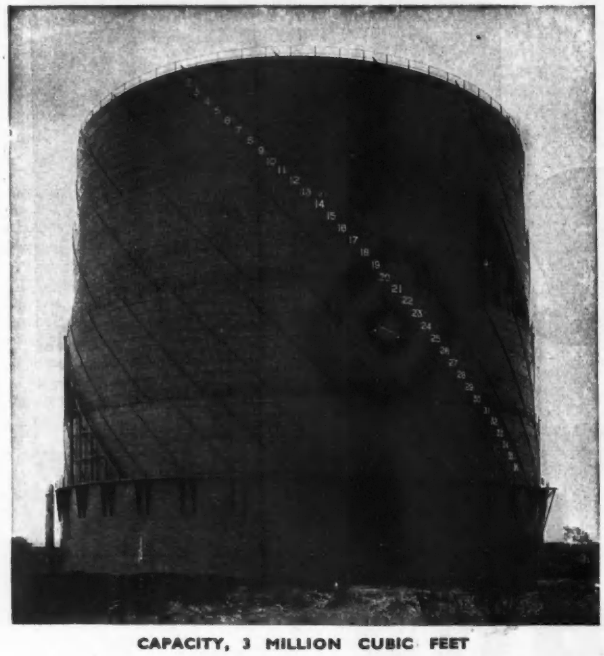

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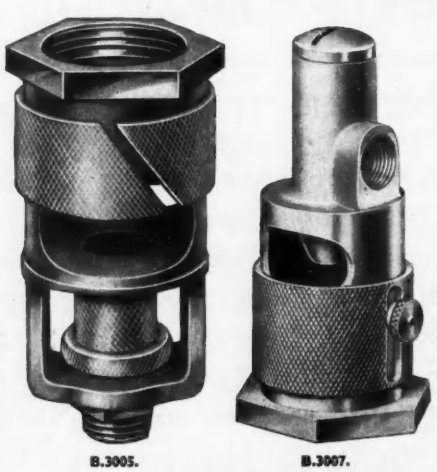

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Henry Balfour

The above company, gas and chemical engineers of Leven, Fife, have recently issued £210,000 of 5% loan stock as part of their programme of expansion.

The company was founded in 1810 and was incorporated in 1896. With the advent of coal gas early in the nineteenth century they quickly became leading producers of complete plant and erected these in many parts of the world. In 1929 Mr. W. Lindsay Burns joined the company, later to become Vice-Chairman and Managing Director. Under his energetic leadership the company acquired the shares of the old-established chemical engineering concerns of Ernest Scott & Co., Ltd., and George Scott & Son (London), Ltd., and also formed, in association with the Pfaudler Co. of Rochester, U.S.A., Enamelled Metal Products Corporation (1933), Ltd., to produce glass-enamelled steel equipment. The acquisition of interests in these companies resulted in considerable expansion of the company's activities and enabled them to offer a comprehensive engineering service for the design, manufacture and installation of plant for many industries. Balfours are registered with Lloyds as Class I welders—a distinction enjoyed by comparatively few companies.

Since 1929 productivity has multiplied many times and is still increasing. Contracts are continuously being secured both at home and abroad, and there are sufficient orders in hand for 18 months' work at full capacity. The Balfour group of companies today employs nearly a thousand personnel and their works at Durie Foundry covers an area of approximately 1,000,000 sq. ft. *Henry Balfour & Co., Ltd., Leven, Fife.*

Elliott Bros.

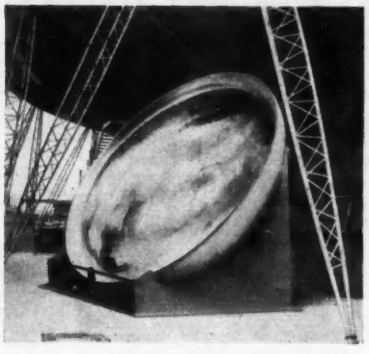
The 'Elliott Journal,' Volume One, Number One, has reached our office. The Publishers hope, by means of this Journal, to acquaint industry with the developments in physical science and industrial equipment which emanate from their organisation. They hope that the Journal will be issued at six monthly intervals and those interested can obtain a copy on request to: *Elliott Brothers (London), Ltd., Century Works, Lewisham, London, S.E.13.*

Publications

We acknowledge with thanks the 'Carron Cupula,' the magazine of the *Carron Company* and 'Links,' the digest of *Alexander Duckham & Co., Ltd.*, which is issued in the interest of the users of their lubricants. *The Power-Gas Corporation, Ltd.*, publication—OP 451—being a selection of their productions with photographs. *The Morgan Crucible Co., Ltd.*, publication Morganite 'Reservoil' metric conversion tables —reference S.D.33.

G. A. Harvey

It is not often gross errors are made in our leading columns, but in this case we have to admit we got hold of the wrong end of the saucer. This huge saucer-like metal head is burnished till it shines. Although some 12 ft. 6 in. in diameter, the steel is 1¼ in. thick, and was spun from 15 ft. 10 in. diameter flat chrome-clad disc weighing 5¾ tons. These spun heads are one of the



many activities of the Company at their Thames side works at Greenwich, where their rotarpress spinning plant is capable of spinning flat plates up to 4 in. in thickness producing semi-ellipsoidal heads from 5 ft. inside diameter to a finished head produced from an 18 ft. diameter flat plate.

They are used as ends for pressure vessels for the oil, chemical and many other industries. *G. A. Harvey & Co. (London), Ltd., Greenwich, London, S.E.7.*

Metronic

The most important modification, the '141 Single Column' gauge is the method of joining the ends of the glass tube to their metal companions. The pressure connection is a combination gland pressure screw and solderless union. The pressure screw squeezes a synthetic rubber ring direct on to the glass tube end, making a perfect seal which will hold, even though pressure is taken up to bursting point of the metal reservoir. The other end of the glass tube is similarly sealed to a steel or copper tube which runs direct to the reservoir.

Although the normal guaranteed maximum working pressure for gauges connected differentially is 150 lb./sq.in., the new type 141 gauge is now regularly used in large quantities for measuring oxygen pressure drop in a system under a pressure of 300 lb./sq.in. The type 141 gauge series covers the entire range of pressures, draughts and differentials from 0-1 in. W.G. up to 0-60 in. Hg. The machine-cut scales are contracted to about 97% to provide direct reading of an extremely high order of accuracy. All steel parts are waterised; this means that any gauge may be used for either water or mercury filling. Flow measurement of gas, liquid or steam is ideally catered for by these gauges; flow gauge scales are graduated in any desired flow units. *Metronic Instrument Co., Ltd., Ettingshall, Wolverhampton.*

WALES & MONMOUTHSHIRE — Concluded from P. 372

He questioned, however, whether the gas industry was doing all that it might do in connection with fuel efficiency. In view of the shortage of the right type of coal he asked whether it was wise to install so many continuous vertical retorts requiring special coals, or whether it would not be better to adopt intermittent verticals or coke ovens to a greater extent.

The golf competition for the Upjohn Cup was played at the Maesdu Golf Club on the morning of May 3, the best scores being returned as follows: 1, Trevor Morgan (75 net); 2, Darrell Rees (78 net); 3, I. Rowlands (79 net). In the afternoon competition for the Dean Cup the winning scores were: 1, Darrell Rees (rec. 3—30); 2, J. S. Smith (rec. 10—29) and A. Sadler (rec. 11—29) tied; J. S. Smith declared 2nd by winning on second half; 3, W. Clark Jackson.

The bowls handicap competition for the Holmes Hunt Rose Bowl was played at the Craig-y-Don green. C. H. Davidson was the winner with a score of 43, and Gordon Hogg was second with 39.

The trophies were presented at dinner on the Thursday evening by Mrs. Powdrill. It was announced that tankards for the golf winners had been given by Mr. J. P. Smith (2), Mr. W. Morland Fox (2), Mr. J. B. Clay, and Mr. W. A. Lowe.

Also on the Thursday there was a coach tour through some of the finest North Wales scenery, with tea at Llanberis.

There was dinner and dancing on the Thursday and Friday evenings, and on Friday there was also a very popular showing of two of the latest Gas Council films, introduced by Mr. R. J. Gregg, Publicity Manager.

The Gas Officers' Guild

The spring meeting of the Wales and Monmouthshire Section of the Institution was preceded on May 2 by the annual general meeting of the Wales branch of the Gas Officers' Guild.

Mr. J. F. Rust (Newport), Chairman of the branch, Mr. O. P. Cronshaw (Rhyl), Vice-Chairman, and Mr. Elwyn Jones (Rhondda), Hon. Secretary, were re-elected for the ensuing year.

In place of the retiring members of the Executive Committee, Mr. E. Ablett (Swansea), Mr. K. E. Tiddy (Carmarthen) and Mr. J. R. Wood (Bangor), the following members were elected: Mr. W. F. Edwards (Port Talbot), Mr. D. E. West (Merthyr Tydfil), and Mr. H. Maycock (Holywell and Flint).

Mr. J. R. W. Alexander, Executive Chairman of the Guild, addressed the meeting.

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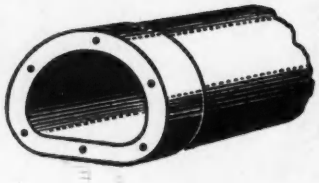

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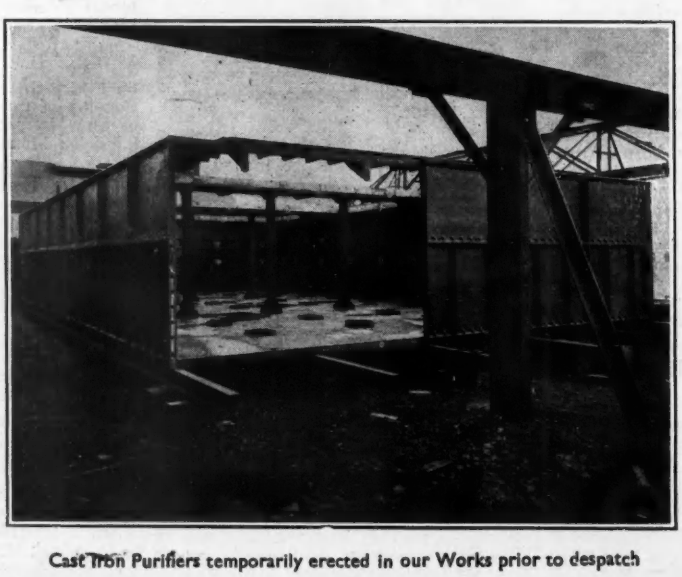

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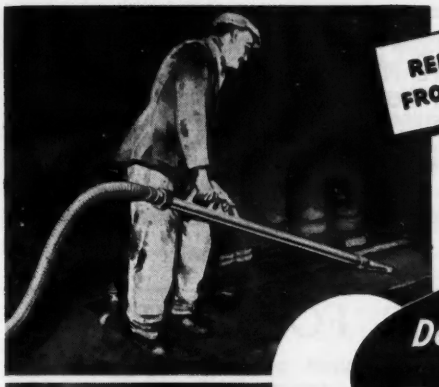

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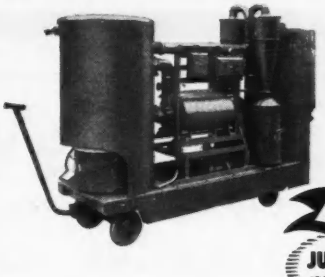

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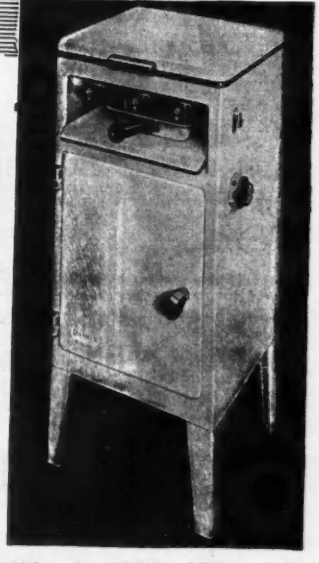

This efficient little cooker of large capacity is made especially for small kitchens and flats.

Its cast iron construction ensures durability and low maintenance cost.

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APPOINTMENT VACANT

SOUTHERN GAS BOARD

CENTRAL DIVISION.
FARNHAM AND DISTRICT GAS UNDERTAKING.
TECHNICAL ASSISTANT.

APPLICATIONS are invited from suitably qualified persons for the post of TECHNICAL ASSISTANT with the above Undertaking.

Applicants should have had Works, Distribution and Drawing Office experience.

The commencing salary will be in accordance with qualifications and experience and will be in the range of A.P.T. Salary Grades IV or V of National Joint Council for Gas Staffs.

Applications stating age, and giving full particulars of training, qualifications and experience, together with the names of two referees should reach the undernamed not later than Friday, May 25, 1951.

D. RITCHIE,
Group Manager.

235, London Road,
Camberley,
Surrey.

PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/-; by post 1/2d.

NEW SUBSCRIPTION and CLASSIFIED ADVERTISEMENT RATES OPERATING FROM JAN. 1, 1951.

Subscription Rates: Home and Empire :- 52/- per annum; Foreign :- 60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.¶

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS OFFICE: 10, Union Street, Birmingham.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. 'Phone: Harrogate 84291.

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APPOINTMENTS VACANT (*ctd.*)

WEST MIDLANDS GAS BOARD

WALSALL DIVISION.

ASSISTANT DRAUGHTSMAN—

WALSALL DISTRICT.

APPLICATIONS are invited from suitably qualified persons for the position as ASSISTANT DRAUGHTSMAN at the Pleck Works, Walsall District.

The salary for the post will be not less than £385 per annum on commencement rising by annual increments to a maximum of £465 per annum, in accordance with Grade V of the salary scales of the National Joint Council for Gas Staffs.

Applicants should possess a sound knowledge of structural and general engineering work.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt in future. Any existing superannuation rights in the Gas Industry would be maintained.

Applications giving personal details, particulars of training, qualifications and experience, and the names of two referees, should be addressed to Mr. E. Hardiker, Divisional Manager, West Midlands Gas Board, Walsall and District Division, Walsall Factory Estate, Tame Bridge, West Bromwich Road, Walsall, to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON & DISTRICT DIVISION.

WILLENHALL DISTRICT—

ASSISTANT ENGINEER AND MANAGER.

APPLICATIONS are invited from suitably qualified persons for the position of FIRST ASSISTANT to the Engineer and Manager.

Candidates should have had some experience of manufacture, distribution and sales. Preference will be given to candidates who have successfully assumed responsibilities in a small Undertaking and details of this should be stated in the application. Possession of the Higher Grade Certificates in Gas Engineering would be considered advantageous.

The salary for the post will be not less than £570 per annum on commencement, rising by annual increments of £25 to a maximum of £670 per annum which is in accordance with Grade X of the salary scales of the National Joint Council for Gas Staffs.

The appointment will be subject to the provisions of such superannuation scheme as the Board may in due course adopt, but existing superannuation rights in the Gas Industry will be safeguarded. The successful candidate may be required to pass a medical examination.

Applications giving details of age, qualifications, and experience, together with the names of at least two referees, should be addressed to Mr. F. C. Briggs, Divisional Manager, West Midlands Gas Board, Wolverhampton and District Division, Kensington House, Bath Street, Dudley, Worcs., to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

WALSALL AND DISTRICT DIVISION.

ACCOUNTANCY ASSISTANT

(CONSUMERS' ACCOUNTS).

APPLICATIONS are invited for the post of ACCOUNTANCY ASSISTANT (CONSUMERS' ACCOUNTS) at the Divisional Headquarters of the Walsall and District Division.

Applicants should have a sound knowledge of accountancy principles and experience in mechanised accounting, preferably in a Public Utility Undertaking.

The salary for the post will be not less than £520 per annum on commencement, rising by annual increments to a maximum of £620 per annum in accordance with Grade IX of the salary scales of the National Joint Council for Gas Staffs.

The appointment will be subject to such superannuation regulations as the Board may, in due course adopt, and the successful candidate may be required to pass a medical examination.

Applications, giving details of age, qualifications and experience, together with the names of two referees, should be addressed to Mr. E. Hardiker, Divisional Manager, West Midlands Gas Board, Walsall and District Division, Walsall Factory Estate, Tame Bridge, Walsall, to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION.

DUDLEY DISTRICT—

WORKS SUPERINTENDENT.

APPLICATIONS are invited for the position of SUPERINTENDENT of the Dudley Gas Works. The plant consists of Glover West and Woodall-Duckham Vertical Retorts and large Automatic C.W.G. plant.

The Works Superintendent will be responsible to the Engineer and Manager for the control of all technical staff and work people engaged on the Works, and for the operation and maintenance of works plant and vehicles. Good organizing ability and experience in a similar position are essential. Possession of appropriate examination certificates would be considered advantageous.

The salary for the post will be not less than £570 per annum on commencement, rising by annual increments of £25 to a maximum of £670 per annum, in accordance with Grade X of the salary scales of the National Joint Council for Gas Staffs.

The appointment will be subject to the provisions of such superannuation scheme as the Board may in due course adopt, but existing superannuation rights in the Gas Industry will be safeguarded. The successful candidate may be required to pass a medical examination.

Applications giving details of age, qualifications, and experience, together with the names of at least two referees, should be addressed to Mr. F. C. Briggs, Divisional Manager, West Midlands Gas Board, Wolverhampton and District Division, Kensington House, Bath Street, Dudley, Worcs., to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

NORTH STAFFORDSHIRE DIVISION.

NEWCASTLE-UNDER-LYME DISTRICT—

DISTRIBUTION SUPERINTENDENT.

APPLICATIONS are invited from suitably qualified persons for the above position.

The successful candidate will be responsible to the District Manager for all matters of gas distribution and utilisation within the district, including preparation of estimates, etc.

The salary for the post will be not less than £490 per annum on commencement rising by annual increments to a maximum of £570 per annum, in accordance with Grade VIII of the salary scales of the National Joint Council for Gas Staffs.

The appointment will be subject to such superannuation regulations as the Board may, in due course, adopt, and the successful candidate may be required to undergo a medical examination.

Applications stating age and details of qualifications and experience together with the names of two referees, should be addressed to Mr. J. E. Stanier, Divisional Manager, West Midlands Gas Board, North Staffordshire Division, Etruria, Stoke-on-Trent, Staffs, to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

WEST MIDLANDS GAS BOARD

WALSALL DIVISION.

ASSISTANT GROUP ENGINEER CANNOCK GROUP OF UNDERTAKINGS, COMPRISING CANNOCK, LICHFIELD AND TAMWORTH DISTRICTS.

APPLICATIONS are invited from qualified persons for the above position.

Candidates should possess the Higher Grade Certificate (Gas Manufacture) of the Institution of Gas Engineers, and have received a thorough training in all branches of gas production. Experience in the operation of Intermittent Vertical Chambers and Horizontal Retorts would be an advantage.

The successful applicant will be responsible to the Group Engineer and Manager for the general supervision of gas production and plant maintenance at the three Works within the Group, and other duties which may be assigned to him.

The salary for the post will be not less than £645 per annum on commencement rising by annual increments to a maximum of £770 per annum in accordance with Grade XII of the salary scales of the National Joint Council for Gas Staffs.

The successful applicant may be required to pass a medical examination and will be subject to such superannuation regulations as the Board may, in due course, adopt.

Applications, stating particulars of age, education, qualifications and experience, together with the names of two referees, should be addressed to Mr. E. Hardiker, Divisional Manager, West Midlands Gas Board, Walsall and District Division, Walsall Factory Estate, Tame Bridge, West Bromwich Road, Walsall, to reach him not later than fourteen days after the appearance of this advertisement. Applicants are requested to quote ref. T.P.3, when replying to this advertisement.

F. H. CURETON,
Secretary.

(Classified advertisements continued on Supplement 4)

APPOINTMENTS VACANT (ctd.)

EASTERN GAS BOARD
IPSWICH DIVISION.
COLCHESTER UNDERTAKING.

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT at Colchester Gas Works.

Applicants should hold the Institution's Higher Grade Certificate in Gas Engineering (Manufacture) and have experience as well as the practical knowledge of general works operation, control of Continuous Vertical Retorts and drawing office and laboratory practice. Constructional experience will be an advantage.

Housing accommodation will be made available at a reasonable rental.

The salary will be in accordance with Grade VI, £415 to £495 per annum.

Applications, stating training, experience, qualifications and age, should be addressed to the undersigned to be received within fourteen days of the date of this advertisement. The application should give the names of two referees.

F. ALLEN,
Group Manager.

Eastern Gas Board,
Gas Works,
Colchester.

SOUTHERN GAS BOARD
PORTSMOUTH, GOSPORT AND BOGNOR REGIS GAS UNDERTAKING.
DISTRICT MANAGER.

APPLICATIONS are invited from suitably qualified persons below the age of 40 years, for the position of DISTRICT MANAGER, at a commencing salary ranging between £570 and £670 per annum (A.P.T. X), inclusive of current War Bonus. Applicants should have served a period of pupilship or other instruction in the Sales and Fittings Department of a Gas Undertaking and the holding of theHigher Grade Certificate in Gas Engineering (Supply) of the Institution of Gas Engineers will be an advantage. The successful candidate will be expected to work to the direct instructions of the Sales Manager, to whom he will be a principal assistant, and the duties will include the control and training of all Gas Fitters, Apprentices and Maintenance Fitters working on the District of the Undertaking. Particular regard will be paid to a candidate's practical training and knowledge and his responsibility in this sphere in the immediate past.

The successful applicant will be expected to reside in a house which is the property of the Undertaking, at a reasonable rental for which will be paid by a suitable deduction from salary. He will be required to pass a medical examination.

Applications, stating age, whether married or single, qualifications, training and experience, together with the names of two persons from whom references may be obtained should be forwarded to the undersigned not later than May 31, 1951.

H. M. LAWRENCE,
General Manager.

Gas Offices,
The Square,
Portsmouth.
April 20, 1951.

NORTH EASTERN GAS BOARD
HEAD OFFICE, LEEDS.

APPLICATIONS are invited for the following positions :—

ELECTRICAL ENGINEER

Open to Engineering Graduates or Corporate Members of the Institution of Electrical Engineers at a commencing salary of £1,000-£1,200, the point of entry to be determined by qualifications and experience.

The successful candidate will be required to carry out electrical investigations and to be responsible for the preparation of electrical development schemes at the various Works of the Board.

Candidates must have a sound academic background and have had a wide experience in the layout and installation of electrical equipment in works or factories. Preference will be given to candidates with both drawing office and practical workshop experience.

ELECTRICAL SUPERVISOR

The commencing salary will be within Grade A.P.T. XII of the National Salary Scales (£645-£770) the point of entry to be determined by qualifications and experience.

The successful candidate will be required to supervise the installation of electrical equipment and be responsible for assuring the necessary standard of electrical maintenance at the various Works of the Board.

Preference will be given to candidates of Higher National Certificate standard with a wide experience of electrical installations in large works or factories. Design ability is not essential, but a good knowledge of wiring diagrams and circuit testing, together with extensive workshop experience is necessary.

The successful candidates will be required to pass a medical examination and subscribe to such superannuation scheme as the Board may adopt.

Form of application may be obtained from the Chief Engineer at the address below, and should be returned together with the names and addresses of two referees, not later than fourteen days after the date on which this advertisement appears.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.
May 3, 1951.

NORTH EASTERN GAS BOARD
MAINLAYING INSTRUCTOR.

APPLICATIONS are invited for the above position at a commencing Salary within Grade A.P.T. IX of the National Salary Scales for Gas Staffs (£520-£620) the point of entry to be determined by qualifications and experience.

Applicants should have a comprehensive and practical knowledge of all aspects of mainlaying, be able to receive directions on standardised practices and capable of imparting instruction to Distribution Foremen, Mainlayers and Service layers, through a series of instruction courses, which will be regularly held at Centres within the Area.

Preference will be given to candidates holding Institution of Gas Engineers Certificate in Gas Engineering (Supply).

The successful applicant will be required to pass a medical examination and to subscribe to such superannuation scheme as the Board may adopt.

Form of application may be obtained from the Chief Engineer at the address below and should be returned not later than fourteen days after the date on which this advertisement appears.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.
May 4, 1951.

TOWN COUNCIL OF SPRINGS
TRANSVAAL—SOUTH AFRICA.
Town Engineer's Department.
GAS WORKS SUPERINTENDENT.

APPLICATIONS are invited from suitably qualified persons for the above position.

The successful candidate will be required to supervise the erection of the Gas Works at present being constructed, and subsequently, totake full control of the gas undertaking under the Town Engineer.

The initial manufacturing plant will consist of automatically-operated C.W.G. plant.

Candidates are required to be qualified Gas Engineers, fully conversant with the production of both coal and water gas and to be competent to advise consumers upon the use of gas for industrial purposes.

The salary for the position is within the grade £870 x 30-£930, together with a variable cost of living allowance which, at the present time, is £14 0s. 0d. per month for a married man and £7 0s. 0d. per month for a single man. Thus, at the present time, the total salary grade applicable to a married man is £1,038 x 30-£1,098. This salary scale is subject to revision upon the development of the undertaking.

A contribution of £100 will be made towards the successful applicant's travelling expenses to South Africa. This amount, however, is subject to refund should the person appointed leave the service of the Council, for any reason, before the expiration of two years.

The successful candidate will be required to pass a medical examination prior to appointment and to join the Municipal Employees' Association and the Joint Municipal Pension Fund.

The successful applicant will be given the opportunity, if necessary, of acquiring a house under one of the Council's Selling Schemes.

Applications giving full details of training, qualifications and experience, together with *copies* of Testimonials and details of age and marital status, should be submitted to the Town Engineer, P.O. Box 45, Springs, Transvaal, South Africa, not later than **Friday, June 15th, 1951.**

Applications should be sent by airmail.

DRAUGHTSMAN with sound knowledge of gasworks and allied chemical plant design required. Age 35 or upwards. Pension scheme. Permanent position to suitable applicant.

Fullest details of experience, age and salary, to R. & J. DEMPSTER, LTD., Gas Plant Works, Manchester 10.

NORTH WESTERN GAS BOARD
BLACKBURN GROUP.
CARBONISING SUPERINTENDENT.
GREENBANK WORKS—BLACKBURN.

APPLICATIONS are invited for the above position.

The successful applicant will be responsible to the Station Engineer for the supervision and technical control of a Glover West Continuous Vertical Retort Plant (nominal capacity 6 million cu. ft. per day), together with ancillary plant.

Applicants should possess the Higher Grade Certificate (Gas Engineering—Manufacture) of the Institution of Gas Engineers, or its equivalent.

The commencing salary will be within Grade A.P.T. VIII of the National Salary Scales (£490-£570 per annum) according to experience and qualifications.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, suitably endorsed, giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the General Manager, North Western Gas Board (Blackburn Group) Cardwell Place, Blackburn, not later than twelve days after the publication of this advertisement.

NORTH WESTERN GAS BOARD
LANCASTER-MORECAMBE GROUP.
HOME SERVICE ADVISER.

APPLICATIONS are invited for the above position within the Lancaster-Morecambe Group, at a salary within Grade A.P.T. V (female) of the National Salary Scales (£308-372 per annum).

Candidates should hold a qualification in Domestic Science and have experience in the organisation of cookery demonstrations, lectures and district home service calls.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications appropriately endorsed, giving personal details, particulars of training, qualifications and experience together with the names and addresses of two referees should reach the General Manager, North Western Gas Board (Lancaster-Morecambe Group) Gas Works, St. Georges Quay, Lancaster, not later than fourteen days after the publication of this advertisement.

SOUTH WESTERN GAS BOARD
NORTH DEVON SUB-DIVISION.
APPOINTMENT OF
DISTRIBUTION SUPERINTENDENT,
MINEHEAD AND WATCHET UNITS.

APPLICATIONS are invited for the above appointment. Applicants should have a sound practical knowledge of gas fitting and mainlaying work, and possess the Higher Grade Certificate in Gas Engineering (Supply).

The successful applicant will be responsible for the Mains, Service, and Fittings Departments, together with the interviewing of consumers.

The salary will be in accordance with Grade VII of the Board's Scale, viz.: £435 to £515.

Applications giving full particulars of qualifications and experience should be addressed to the undersigned not later than May 26, 1951.

J. H. LOWTHER,
Manager.

The Strand,
Barnstaple,
N. Devon.

SOUTH WESTERN GAS BOARD
CHELTENHAM SUB-DIVISION.
ASSISTANT STATION ENGINEER,
CHELTENHAM WORKS.

APPLICATIONS are invited for the position of ASSISTANT STATION ENGINEER at the Cheltenham Gas Works. Candidates should possess the Higher Grade Certificate of the Institution of Gas Engineers (Manufacture) and have had sound experience in the operation of Horizontal, Continuous Vertical Retorts and modern C.W.G. manufacturing plants.

The successful applicant will be responsible to the Station Engineer for the general supervision of all activities carried out on the Works, including the control of labour.

The commencing salary will be within the range of Grade IX of the National Salary scales (£520-£620) according to experience and qualifications.

The successful applicant may be required to pass a medical examination.

A house will be available at a reasonable rent.

Applications giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than May 19, 1951.

A. L. MORRIS,
Manager.

Cheltenham Sub-Division,
South Western Gas Board,
North Street,
Cheltenham, Glos.

SOUTH WESTERN GAS BOARD
SOUTHERN DIVISION.
NO. 6 SUB-DIVISION—
SOUTH CORNWALL.
PRODUCTION ENGINEER.

APPLICATIONS are invited for the post of PRODUCTION ENGINEER for the South Cornwall Sub-Division which includes the following Undertakings :—

Truro, Penzance, Falmouth, Newquay, St. Austell, St. Ives, Camborne, Bodmin, St. Blazey, Redruth, Padstow, Hayle, Wadebridge, Fowey, Lostwithiel, Penryn, Helston and St. Just.

The person appointed will be responsible to the Sub-Divisional Manager for Production within the Sub-Division, and must have had a sound training and practical experience in large Works, including the construction and operation of Continuous Vertical Retort Plants, together with C.W.G. Installations and Ancillary Plant associated with such Works. Constructional experience will be an advantage.

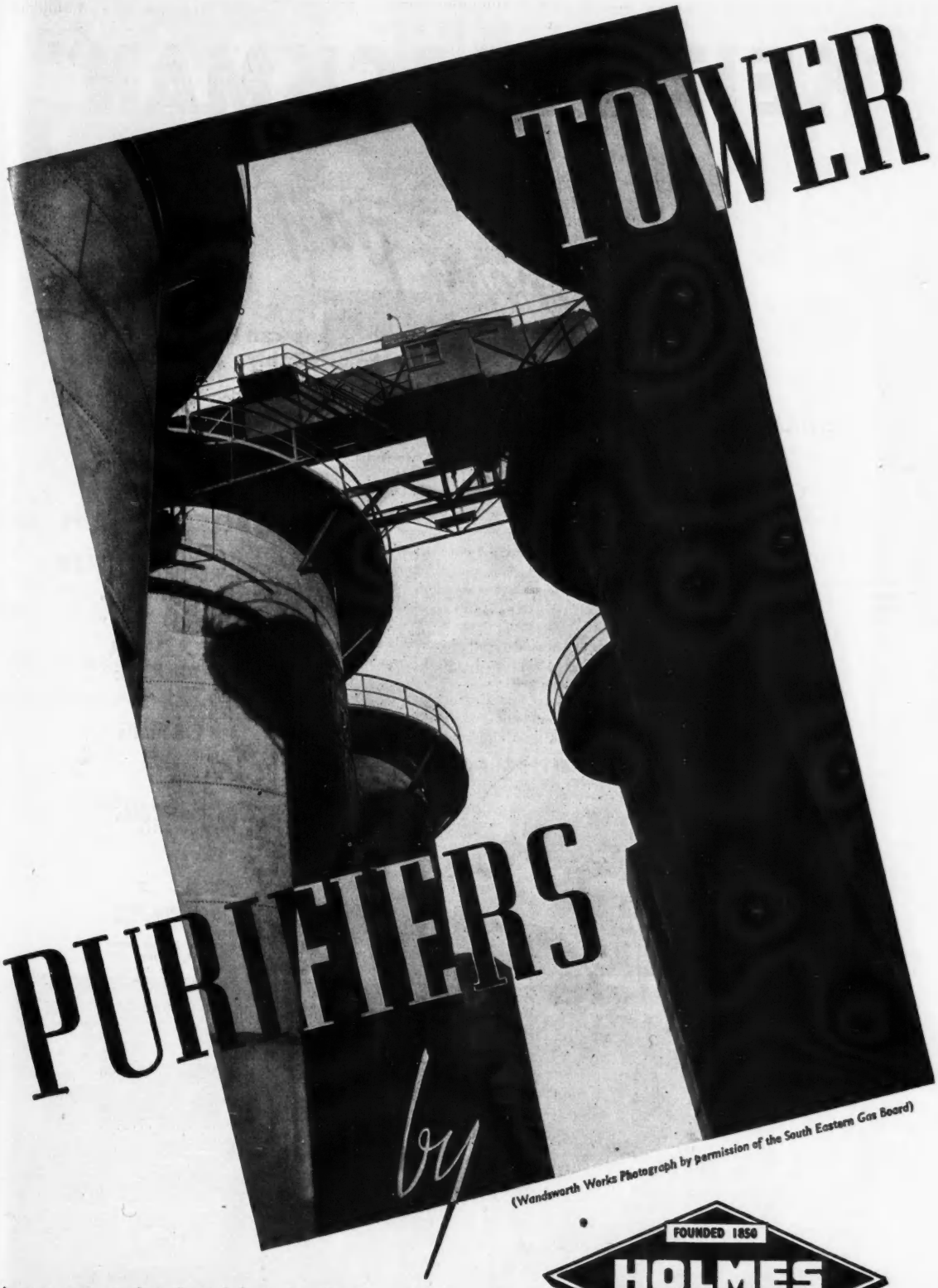
Candidates must be Corporate Members of the Institution of Gas Engineers, or possess equivalent qualifications.

The salary for the position will be £800 per annum and the successful candidate will be required to pass a medical examination.

Applications, stating age and full details of education, training, experience, with position held, together with *copies* of three recent Testimonials should be delivered to the undersigned not later than 10.0 a.m. on Monday, May 28, 1951.

T. L. TALLENTIRE,
Manager.

South Cornwall Sub-Division,
South Western Gas Board,
18, Boscawen Street,
Truro, Cornwall.
May 2, 1951.



TOWER

PURIFIERS

by

(Wandsworth Works Photograph by permission of the South Eastern Gas Board)

A repeat order has been received from Wandsworth, and now nine similar installations are in hand for seven undertakings.

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"KEITH-BLACKMAN"

FANS *for every purpose*

for which fans can be employed profitably in or by the Gas Industry

VENTILATION

GAS BOOSTING and EXHAUSTING

FORGE and FURNACE BLAST

MAN-COOLING

WE make all types of Fans—"High Efficiency" for boosting or exhausting gas up to 3 lbs. p.s.i. and for volumes from 5,000 to 1,500,000 cfph; Cast Iron and Steel-plate "Pressure" fans for up to 2 lbs. p.s.i. air blast to furnaces, forges, water gas plants, burner equipment, etc; "Turbo" fans for applications requiring up to 6 lbs. p.s.i.; "Centrifugal" fans for draught on boiler fires to ensure economical steam production, or for cold air douche to workers in retort houses, etc.; "Centrifugal" or "Axial" fans for supplying ventilating air through ductwork; "Propeller" fans for moving air in volume for ventilating; "Propeller" fans on portable structures for cooling workers at furnace fronts; and "Tenaxe" fans for re-circulating high temperature gases and air in various types of heat treatment furnaces. WHEN you need fans for moving air or gases give us an opportunity of making practical suggestions.

HEATING

MECHANICAL DRAUGHT

FURNACE RE-CIRCULATING

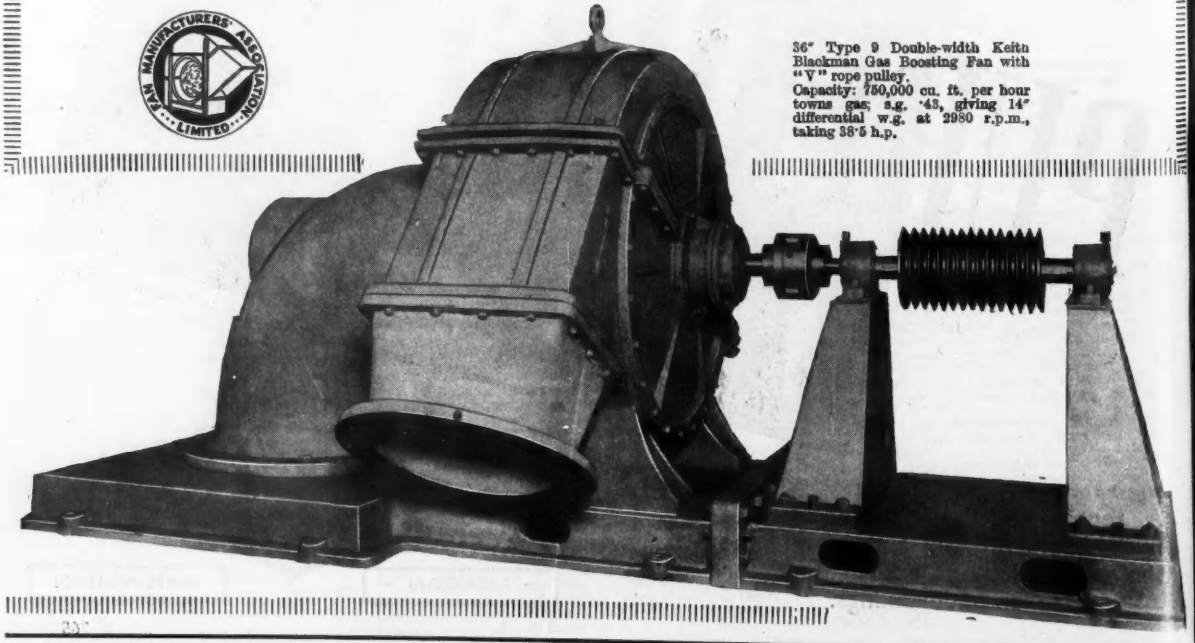
COLD AIR DOUCHE

DRYING

KEITH-BLACKMAN LTD
MILL MEAD ROAD, TOTTENHAM, LONDON, N.17.
TN: TOTtenham 4522. TA: "Keithblac Norphone London."

MANCHESTER, 4: 26 Corporation Street. Tel. No.: Blackfriars 4228. BIRMINGHAM, 2: 75 New Street. Tel. No.: Midland 0317-8.
LEEDS, 1: 40/41 Royal Exchange Chambers. TN: Leeds 27286. NEWCASTLE-ON-TYNE 1: 21 Mosley St. TN: Newcastle 22284.
SCOTLAND: 90 Mitchell Street, Glasgow, C1. TN: Central 7973. IRELAND: 7 Brunswick St. Belfast. TN: Belfast 21114.
SOUTH WALES: 127 Stanwell Road, Penarth, nr. Cardiff. TN: Penarth 249.

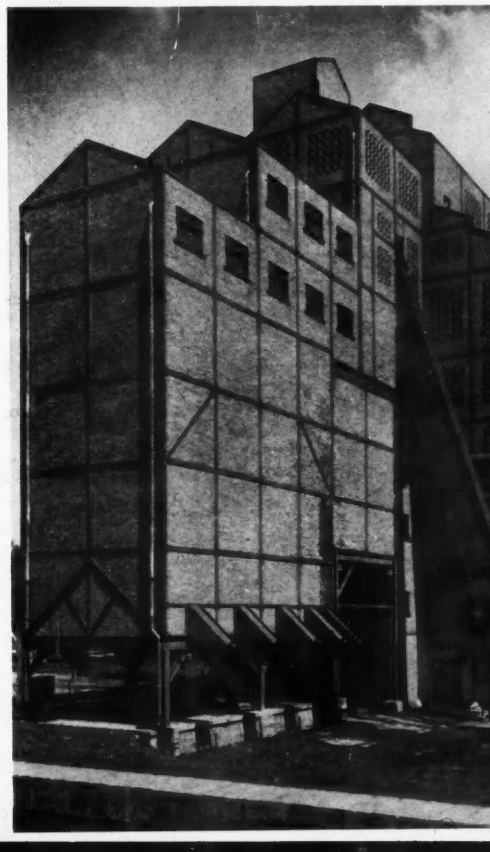
FAN MANUFACTURERS' ASSOCIATION ... LIMITED ...



36" Type 9 Double-width Keith Blackman Gas Boosting Fan with "V" rope pulley.
Capacity: 750,000 cu. ft. per hour towns gas; s.g. '43, giving 14" differential w.g. at 2980 r.p.m., taking 38·5 h.p.

Printed by STRAKER BROTHERS LTD., E.C.2, for WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C.4. Wednesday, May 9, 1951.

Work in progress



BOX HILL, VICTORIA
AUSTRALIA

A view of the Coke Plant end of the new Glover-West Retort House.

West's Gas
IMPROVEMENT CO., LTD.
MILES PLATTING, MANCHESTER, 10
Telephone: COLlyhurst 2961–5. Telegrams: Stoker, Manchester.
London Office: COLUMBIA HOUSE, ALDWYCH, W.C.2. Telephone: HOLborn 4108–9. Telegrams: Wesgasco, Estrand.

"... we have each of us a trade and are in our proper position when exercising it..."

Wellington's reply to Canning in 1827 when asked to become Prime Minister.

WELLINGTON TUBE WORKS LTD

FOR STEEL TUBES AND STEEL TUBE FABRICATION

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